ARCHIVES OF OTOLOGY.

A STUDY OF PAPUAN HEARING.

By CHARLES S. MYERS, M.A., M.D., Cambridge, England.

THESE experiments, of which a concise but necessarily incomplete summary is here attempted, were made during the visit of Dr. Haddon's expedition to Murray Island. They seem to be the first that have been conducted with a view to determining the auditory acuity, the highest audible tone, and the minimum perceptible difference of pitch among a primitive people. They will be published at full length in a forthcoming number (vol. ii., part 2), of the *Reports of the Cambridge Anthropological Expedition to Torres Strait* (University Press, Cambridge, England).

I.—*Acuity of Hearing.*

This is an exceedingly difficult subject of investigation anywhere, but in Murray Island the constant rustle of the palm-leaves and the beating of the surf on the shore aggravated the difficulty. After futile attempts with Politzer's hœrmesser, I had to lay it aside in favor of a stop-watch. A neighboring island, which I did not visit, proved quiet enough for my colleague, Dr. Rivers, to use the hœrmesser. He tells me that hardly any native there could hear as well as another member of the expedition, who was tested along with the islanders, and was found to have, for a European, only moderately acute hearing. My own inquiry was for the most part confined to children. Otorrhœa did not appear to be at all common during our stay on the island; moreover, I was anxious to avoid the possible interference of past sea-diving on adult auditory acuity. Either Dr. Rivers or I was always tested along with the islanders, the

other of us holding the watch (a Runne's clock). External noises varied so much from day to day that I found it impossible to compare the results obtained from islanders on one day with those obtained from others on the next. Unless some fixed person was tested simultaneously with the natives, the experiments proved useless. In all, thirty natives were examined.

I cannot here quote the data on which my conclusions rest. The evidence appears to show that a considerable number of the islanders has slightly subnormal hearing, that in a small proportion (chiefly in those who have had otorrhœa after deep sea-diving) hearing is very decidedly defective, and that it is exceedingly rare to find an islander whose hearing equals the hyperacute hearing of many Europeans.

II.—*The Upper Limit of Pitch.*

In these experiments I used a Galton-whistle made by Hawksley, of Oxford Street, London. The diameter of the bore is 1 *mm*, and it is graduated according to the formula $n = \frac{v}{4l}$, where n is the number of vibrations, v the velocity of sound, l the variable length of the whistle. Reliance cannot, however, be placed on the accuracy of such estimations. From this cause, also from variations in tone-intensity and from the employment of different methods of tone-production, have arisen the surprisingly different results, varying from 18,432 vibr. (Zwaardemaker), to 40,960 vibr. (Preyer), which even recent observers have adduced from experiments on European ears.

Fortunately my own work is free from such sources of fallacy, as I used the same Galton-whistle under precisely the same conditions (save for negligeable differences of temperature), first among the Murray Islanders in the Torres Straits, and later among a number of country-folk in north-east Scotland. My results, therefore, are independent of an accurate determination of the note emitted by the whistle, and I am consequently able to compare the upper limit of hearing among a primitive and a civilized community, simply

by observing the length of the whistle on each occasion when that limit was reached.

I hope shortly to estimate the pitch of my whistle by aid of a modified form of Kundt's dust figure-apparatus, but for the present it must suffice merely to state the whistle-length in millimetres. The figures in brackets give the number of subjects investigated within each age-group.

Age.	Whistle-Length at Upper Limit.	
	in Murray Isl. (44)	in Scotland. (29)
– 9	2.23 (2)	1.97 (4)
10–19	2.26 (17)	1.99 (9)
20–29	2.91 (6)	2.23 (3)
30–39	3.16 (7)	2.70 (5)
40–49	3.72 (6)	2.79 (5)
50–59	4.60 (6)	3.98 (3)

Those whose hearing in both ears was defective, or in whom otoscopical examination revealed obvious signs of disease, are here excluded. The whistle was held at a metre's distance from the subject's ear. After a little practice, the india-rubber bulb, which I attached to the whistle, could be compressed so as to give time after time a blast of sufficiently constant force. Five determinations were made for each ear. Finally the average for the two ears (except in the rare cases of unilateral deafness) was taken. The interest shown by the Murray Islanders in these experiments was astonishingly great. The children, indeed, were considerably more attentive than their fellows in Scotland.

The results show that from childhood onwards a higher tone is heard by the European than by the Papuan ear. They also show, as Zwaardemaker has before found, that the range of hearing varies according to the age of the subjects investigated. It might be thought that sea-diving would have produced intra-aural changes unfavorable for a high upper limit of pitch. But Murray Island children showed the same inferiority as the adults: nor could islanders who had never dived hear a higher tone than the majority of those who had dived.

III.—*The Least Perceptible Difference of Pitch.*

Here again I am able to present a series of experiments, performed under strictly comparable conditions upon the children and adults of Murray Island and later on village school-children and people in northeast Scotland. I used two forks of the same pitch, $c' = 256$. An arm of one of the forks was graduated and carried a sliding metal clamp which could be screwed fast to the arm at any desired position; by this means its pitch could be made to differ by relatively small or great amounts from that of the other fork. Before applying the forks successively to the ear of the subject (who sat with his back towards me), I took care always to listen to them first myself, so as to be sure that the intensity of the sounds did not materially vary. Each fork was applied to the ear for about two seconds. The interval between the withdrawal of the first and the presentation of the second fork was likewise about two seconds, during which the second fork was being struck. The subject was then asked which of the two forks was the higher, or whether he thought they were of the same pitch. After a short preliminary explanation of the general procedure, I began the experiment by presenting an interval so large that the subject could not fail to appreciate it. Next I rapidly and roughly arrived at an interval which was too small for his correct appreciation. I then worked gradually towards the threshold from a point which was clearly above it. Having reached and passed below this threshold, I gradually increased the interval between the forks again, until once more I arrived at the point of just perceptible pitch-difference. I applied the two forks five times for each position of the clamp, and was not satisfied that the subject had correctly appreciated the given interval unless he had given at least four successively correct judgments at the corresponding position of the clamp.

When later I came to determine the vibration-frequencies of the tones of the variable fork, Mr. G. T. Bennett, of Emmanuel College, Cambridge, kindly gave me the benefit of his considerable practice in beat-counting. From a mathe-

matical study of our results, he has no doubt that they are to a sufficient approximation correct.

The general education of the Murray Island children was not very different from that in a British village school. They were all taught to sing European airs in class-time, and they did so with remarkably exact intonation. The table shows that of the eleven children examined five could

Correctly appreciating a difference of.	11 Papuan children.	15 European children.	20 Papuan adults.	18 European adults.
1 vibr. per sec.	0	0	0	0 (2 *m*)
2 " "	0	0	0	2 (1 *m*)
3 " "	1	2	0	0
4 " "	0	0	1	2 (2 *m*)
6 " "	1	1	0	1
7 " "	0	3	1	2 (1 *m*)
9 " "	2	2	2	0
12 " "	0	2	0	0
14 " "	2	1	2	0
16 " "	2	1	9	3
19 " "	3	3	4	2
22 " "	0	0	1	0

not discriminate between two successive tones less than sixteen vibrations per seconds apart; in other words, five could not appreciate an interval less than an untempered semi-tone. Of the fifteen European children, on the other hand, only four required so large a pitch-difference. The results given by the adult islanders are not so comparable with those obtained in Scotland. They had received no European musical education in childhood. While the school-children were wont to sing European rather than Papuan airs, the adults were limited almost wholly to native music, save for the hymns they had learned to sing (!) in church. Now if third- and quarter-tone music is so widely spread among primitive people, as has sometimes been stated, we might expect them to show a highly refined ability of distinguishing tone-differences. Instead, we find that no less than fourteen of the twenty adult islanders examined fail with intervals less than the semi-tone. The eighteen European adults include six who played a musical instrument; of these three had had valuable practice in tuning the violin,

and one the violoncello. They are separately accounted for in brackets accompanied by the letter *m*, but at most only one or two of them could be termed "highly musical." In Murray Island there were neither stringed nor wind instruments. Several of the islanders examined, however, claimed to be composers of native songs.

Both in Murray Island and in Scotland I have interesting records of the different and often considerable effects of practice, obtained by experimenting on the same subject on two, three, or even four separate occasions. I thus obtained over twenty-five hundred judgments in Murray Island alone. Sometimes the constant, sometimes the variable fork was first sounded, in order to determine the possible influence of the order of presentation. I hope that these results will have special interest when compared with the work of Martin and Müller (*Zur Analyse der Unterschiedsempfindlichkeit*, Leipzig, 1899), who investigated the subject so far as the judgment of different weights was concerned. I do not, however, propose to publish further data here. They will appear later in the above-mentioned volume of the Expedition Reports.

ON THE VALUE OF ELECTROLYSIS IN THE EUSTACHIAN TUBE.

By NORVAL H. PIERCE, M.D.

SINCE 1839 electrolysis has been used by Crussel, Tripier, Mallez, Brenner, Clymer, Rockwell, Newman, and others in the treatment of strictures of the urethra, the rectum, the œsophagus, the nasal duct, and, latterly, of the Eustachian tube. Its employment in tubal disease has gained fresh impetus since the publication of Duel's paper in 1897,[1] though his efforts, as he himself discovered, were anticipated by Cumberbatch and Steavenson,[2] who published a series of seven cases so treated in 1888. The honor of first using electrolysis in the Eustachian tube does not belong to these gentlemen, however. Steavenson, in a note to the editor of *The Lancet* (December 8, 1888), acknowledges the priority of Mercie,[3] Miot,[4] Baratoux,[5] all of whom published papers on this subject in 1884. Robert Newman,[6] in a paper published in 1898, mentions using electrolysis in the Eustachian tube in December, 1894, and refers to the work done in this direction by Mercier and Garricon-Desarines[7] and published in 1884. By substituting a gold bougie for the more or less cumbersome electrodes of his predecessors, Duel greatly improved instrumentation.

Since Duel's papers appeared, several other otologists have published their results, some of which were remarkable for their brilliancy and others not quite so much so. In the discussions which followed the reading of these papers, too, a great dissimilarity of ideas was expressed as to the worth of the procedure. In order to estimate the efficacy of the electrical bougie in the treatment of tubal disease and the

removal of those pathological conditions which might be connected with diminished audition and tinnitus, the writer subjected twenty-one cases during the past twelve months to this mode of treatment.

The electrical current was taken from the Edison street circuit of 110 volts, and led through a Victor shunt-controller. From fifteen to thirty volts were necessary to obtain from two to five milliamperes with the negative pole attached to the Eustachian bougie, while the positive pole in contact with the sponge electrode was held in the hand opposite to the tube operated on. The wrist-clamp, devised by Wendell C. Phillips for connecting the positive electrode with the wrist, may well be recommended, as annoying variations of the current may be caused by inconstant pressure when the sponge is held in the hand. The gold electric bougies, made by Meyrowitz, were employed. Contacts lasted from three to ten minutes. Length of contacts and strength of current varied according to the electrical resistance of the patient and the resistance offered to the passage of the electrode in the tube and the subjective sensations of the patient. Both the plain rubber catheter and the silver catheter were used. The silver catheter insulated by means of rubber tissue is more easily kept clean and more readily adapted by bending, to the peculiar topography of each case, than the rubber catheter. The procedure was nearly always carried on under cocain, all active inflammatory processes having been first allayed and the strictest cleanliness observed.

A brief review of the tuba auditiva will not only refresh memory, but may explain certain points observed in the use of the electrical bougie in the tube, which have been otherwise interpreted or understood. In its passage from the tympanum to the post-nasal space, the tube pursues a course from before, downwards and inwards (medial) obliquely backwards, upwards, and outwards (lateral). The axis of the tube forms with the axis of the external auditory canal, an angle of 150°; with the septum narium, an angle of 45° to 50°; and with the horizontal plane of the head, an angle of 30°. Its tympanal ostium is situate 2.5 *cm* higher, and 1.6

to 1.8 *cm*[6] further posterior than its opening in the post-nasal space. It is composed of two portions, a membrano-cartilaginous and an osseous portion, which join at a more or less obtuse angle. This part of the canal is the most constricted, and is, therefore, called the isthmus. From this point the calibre of the canal gradually but continuously increases toward both the pharyngeal and tympanal ostia, where it reaches its greatest diameters. The measurements of the tube must be maintained in the memory of one using the bougie. Its length, as given by different authors, varies from 34 to 44 *mm*, or circa in minimum 34.4 *mm*, of which three-quarters, or about 24 *mm*, belongs to the membrano-cartilaginous portion, and one-third, or 12 *mm*, to the osseous. Therefore the isthmus, or the most constricted part of the tube, at which the osseous and membrano-cartilaginous portions join at a more or less acute angle, lies 24 to 28 *mm* from the ostium pharyngeum; it has a horizontal diameter of 2 to 4.5 *mm*, while its longitudinal diameter is less than 1 *mm*.[9] The ostium pharyngeum has a longitudinal diameter of 9 *mm*,[10] and a horizontal of 5 *mm*. The ostium tympanicum has a longitudinal diameter of about 4.5 *mm* and a horizontal of 3.3 *mm*. The surface is slightly spiral, so that the anterior and outer wall of the cartilaginous portion becomes the inferior wall of the osseous portion, and the posterior inner wall becomes the superior.[8]

The relationship of the mesial wall of the osseous portion to the carotid is most important, inasmuch as only a thin layer of bone separates the two, and in this dehiscences are occasionally found[11]—facts not to be forgotten by those who use wire bougies in this region. The mucosa of the tube is continuous from that of the pharynx, and, in the region of the ostium pharyngeum and for a short distance inwards, is loose, vascular, and lies in large folds which tend to disappear toward the isthmus. These folds form a prominence on the floor of the tube near the pharyngeal opening, which acts as a valve to close the tube when in a state of rest. The part making up the floor is richly supplied with mucous and follicular glands; with these, in the middle of the cartilaginous portion, lymphoid follicles are found in such

abundance, especially in children, as to warrant the name of "tubal tonsil."[12] The mucosa of the osseous portion more closely resembles that of the tympanum, and at or near the isthmus is thin and closely adherent to the bone; as it approaches the ostium tympanicum it becomes thicker and contains tubular glands.

Anomalies of direction have been observed in both the osseous and cartilaginous portions of the tube. Voltolini[13] mentions acute bendings of the osseous portion, and according to Schwartze[14] these anomalies are not of infrequent occurrence. Anomalies of lumen may be due to congenital or acquired pathological changes. Moos[15] relates the case of a deaf-mute with osseous obliteration of the tympanum, in which the opening of the tube admitted only the point of a needle. Toynbee[16] mentions as one of the causes of diminished lumen, the protrusion of the osseous walls; and the same author reports a case in which an enlarged carotid canal so encroached on the tube that only a bristle could with difficulty be passed through. Zuckerkandl[17] instances an abnormally spacious canal for the tensor tympani muscle encroaching on the lumen of the tube. The same author mentions the frequent occurrence of clavate projections at the ostium tympanicum which diminish the lumen of the tube. Congenital narrowing of the ostium pharyngeum has been observed by Urbantschitsch and others. Acquired stricture of the tube may be due to pressure from without its walls, or to disease of the mucosa or submucous tissue, such as occurs in the course of an acute or chronic catarrhal inflammation.[18] Such inflammations may lead to adhesions between the walls of the tubes, which may completely or incompletely destroy its patulency, or they lead to the formation of strands or threads of tissue reaching from one wall to the other and binding them more or less closely together. Inflammation of the submucous connective tissue most frequently leads to stricture at the isthmus, but an inflammatory exudate unorganized, or organized in the pars membrano-cartilaginea, may by interfering with circulation, produce passive congestion of the rest of the tube and of the cavum tympani.

In contradistinction to these commonly accepted views, Siebenmann [19] and Bezold,[20] speaking in a symposium on the treatment of tubal disease, declared they had never, in an enormous number of sections, observed stenosis of the Eustachian tube occurring anywhere but at the pharyngeal or tympanic openings of the tube.

In order to get this paper within the time limits, I shall be unable to read the case histories of the twenty cases, but will give a terse résumé which will answer all practical purposes.

Ten were in the class of oto-sclerosis, or rarefaction of the labyrinthine capsule. Eight were catarrhal. Of the remaining two, one was due to disease of the nervo-muscular apparatus of the tube; the other was one of almost complete obliteration of the membranous portion, due to syphilis.

All the cases had been treated by other methods by myself, before treatment was begun with the electrical bougie. Before beginning with the electrical treatment, all the tubes were explored by means of a celluloid bougie (Urbantschitsch's). In six of the cases of oto-sclerosis, the bougie was arrested at about the isthmus. In two of these six cases, the electrical bougie passed through the osseous portion after the fourth seance. They were all treated for two months, at intervals of a week, with catheterization every other day. In none was audition improved to a noteworthy extent, nor were the entotic sounds diminished. The tuning-fork tests for upper and lower limit, remained unchanged.

In six of the eight cases of catarrhal disease, the bougie was arrested from 4 to 23 *mm* from the pharyngeal opening. In five of them, after four months' treatment, the electrical bougie failed to pass further than the isthmus, or a few millimetres beyond. In two cases in which the bougie passed directly into the middle ear, there were extensive adhesions between the tympanic membrane and the promontory. In none of these cases was there any improvement—that is, further than the improvement gained by the other methods of treatment previously pursued, nor was there any altera-

tion in the adhesions. The case of syphilitic stenosis remained unchanged.

In only two of the twenty cases could any results be ascribed to the electrical bougie. These were both cases of subacute disease with recurrent attacks of defective audition and tinnitus with diminishing intervals. In these cases there were, in all probability, soft infiltrations in the membrano-cartilaginous tube near the isthmus. In both of them the benefit to audition and the subjective symptoms was marked, immediate, and lasting, and these results were obtained after the usual methods of injection—the catheter, inflation, and massage—had ceased to benefit. Occasionally, in other cases, marked improvement to audition was observed immediately after the application of the electrode; that is to say, whereas the patient could hear a whisper at but a few inches before the use of the electrical bougie, immediately thereafter, a whisper could be heard at as many feet. But we cannot ascribe this to the influence of the electricity, inasmuch as we occasionally observe as great improvement following the use of the ordinary celluloid bougie. The explanation of this phenomenon is difficult, but probably takes place by way of reflex stimulation of the nervous apparatus of the ear.[21]

In illustration of how one may be led to erroneous conclusions as to the value of electrolysis when used in this particular region permit me to introduce a case which came to my notice not long since.

A. F., æt. thirty-six, merchant, residing in a town in central Illinois. He complained of diminished audition and tinnitus in the left ear. No pain, no discharge.

Status præsens.—Weber left.

R +
A′ + 50
− 151a
Va 9 ft.

Otoscopy. — *Mt* ham-colored, otherwise negative. Urbantschitsch's bougie No. 3 arrested 2.6 *cm* from pharyngeal opening, which prolonged manipulation failed to pass farther.

Auscultation immediately thereafter gave evidence that the tube was fairly patulous, and of the presence of tenacious mucus. After inflation, hearing distance for whisper was increased to twenty feet. On the following day, bougie No. 4 passed to the tympanum without difficulty.

The case illustrates:

(*a*) that the bougie was arrested by the vertex of the angle of the tube, by a natural projection into its lumen, or by one of those minute fissures or depressions mentioned by Zuckerkandl [22];

(*b*) that there was no stricture;

(*c*) that had the electrical bougie been employed, its passage might have been ascribed to the influence of the electrical current.

It has been said that the use of the electrical bougie is accompanied by less pain than accompanies the use of the ordinary bougie; I have not found this so. On the contrary, I regard the electrical bougie as more painful. The use of the wire bougie in the Eustachian tube is not without danger. Several instances of acute otitis media following the use of the electrical bougie have come to my notice, one, at least, which necessitated an external operation for inflammation in the mastoid cells. There have been two instances where the electrical bougie was broken off in the tube, and when last heard of, the patients were carrying around the remains of the bougie in their tubes.[23] When we remember the relationship between the carotid artery and the tube, and when we further recollect that dehiscences in the bony wall are not of infrequent occurrence, we must realize that accidents of a very unpleasant nature may take place through wounding the carotid by the sharp end of a metal bougie.

Conclusions:

1. In otosclerotic disease, electrolysis is useless.

2. In the great majority of cases of catarrhal disease, it has no advantages over other methods of treatment.

3. In a certain few cases where there is probably a soft exudate near the isthmus, it may be regarded as of some value.

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ACUTE EMPYEMA OF FRONTAL SINUS — OPERATION — DEATH.

By Dr. VON WILD, Frankfurt, Germany.

Translated by Dr. Arnold Knapp.

A perfectly healthy young woman, nineteen years of age, was taken suddenly ill, on June 4th, with coryza and severe headache. The family history is fair. She had apparently never been ill beyond occasional colds in the head and indefinite headache. There had never been an abnormal discharge from the nose, nor had the nose been occluded. The sense of smell was not affected. The headache complicating the coryza was localized from the very beginning to the left frontal region, and occasionally was experienced in the occiput.

On June 5th, the headache became so severe that the patient was forced to go to bed, and the temperature rose to 39°. On the following day the fever and the headache persisted, and vomiting set in. In the evening I saw the patient for the first time. She complained of severe left-sided frontal headache ; sensorium free ; pulse frequent and regular ; no rigidity of the neck, and no retraction of the abdomen ; pressure on the left supra-orbital nerve very painful. Transillumination of the frontal sinuses shows that the left is somewhat smaller than the right, but the light reaction is the same on both sides. The left nose is occluded. There is slight discharge. Beyond redness and swelling of the mucous membrane, there are no signs of prolonged suppuration. The naso-pharynx is normal. The swollen middle turbinate is pressed against the septum. A slight amount of whitish-yellow discharge appears at the infundibulum. The probe is admitted for a short distance, but could not be introduced into the frontal sinus. After cocaine the swelling decreased, and a free discharge of pus appeared, and the nose filled with matter every time the patient sat up. The relief was immediate. The severe headache

disappeared rapidly. The following night the patient's condition was better.

On June 7th the temperature had fallen to 37.8°. The pulse was slower. General condition good. No headache. Some pain remained in occiput. No signs of a general disturbance. The spleen not enlarged. Free discharge of pus. No vomiting. In the evening high fever began, which persisted on the following morning, June 8th. The patient had vomited twice during the night, and was restless. The spleen is now distinctly enlarged. Pulse 120 and regular. Increased occipital pain. No rigidity of the neck, but lateral movements are somewhat painful. Sensorium perfectly free. In the afternoon at two patient became delirious, wanted to get out of bed, and did not recognize her surroundings. Left mydriasis. At five o'clock the left frontal sinus was opened. Preceding this, the left upper eyelid had become œdematous. Patient was delirious.

Operation.—The frontal sinus was freely exposed by removing the entire anterior wall with an osteoplastic flap. As soon as the chisel had entered the cavity, yellowish-green odorless pus was evacuated under moderate pressure. The cavity was found completely filled with pus. The lining mucous membrane was separated from its bony support, and was collected in a bunch in the centre of the cavity, except at the inner and upper corner, where it was adherent and covered with small soft granulations. It was thickened, infiltrated, and discolored. The cavity was curetted, and a defect in the bony wall was looked for, but the bone in no place appeared rough, and seemed everywhere perfectly healthy. It was impossible to pass a probe into the nose. In the middle of the posterior wall a quadrilateral window about 1½ *cm* was made. The dura was not discolored, but seemed very tense. On incising, the surface of the brain protruded, but no cerebro-spinal fluid escaped. The brain surface was shiny and without pulsation. The pia was not thickened. Incisions were made in various directions with negative results. The operation had no influence on the condition of the patient. Coma set in. A high continuous fever with high pulse rate and increased respiration persisted.

On the 10th multiple petechial hemorrhages appeared at the ankles. Death on June 11th. No autopsy.

This case, though incomplete, presents a number of interesting features. A previously healthy girl dies within seven

days from the effects of inflammation of the frontal sinus. The suppuration is unquestionably an acute one. Not only the symptoms, but the rhinoscopic condition and the findings at operation speak for this. In addition to the change in the mucous membrane, which was found infiltrated, bunched together, and detached, the condition of the bone is of importance, as it appeared healthy to the eye and to the probe. Killian says that in acute frontal sinus affections, which run a rapid course and lead to intracranial complications, this unchanged condition of the bone is the usual one, as the time is too short for perforation to take place. On the other hand, in thirty cases of chronic frontal sinusitis with intracranial complications, changes were found in the cerebral wall in twenty-five. The tension of the purulent contents and its high virulence are responsible for the fatal infection. That the pus was evacuated under considerable pressure is proof of the copious discharge which followed the exposure of the infundibular ostium of the frontal duct. It is remarkable to observe that the discharge which set in on the third day and continued through the disease, to a certain extent relieved the subjective and objective symptoms, but did not prevent the progress of the disease.

Death followed from meningitis and general infection. The diagnosis of meningitis, without autopsy, rests on the oculomotor paralysis in combination with vomiting, delirium, deep coma, and increased cerebral pressure. The enlarged spleen and subcutaneous hemorrhages indicate the general infection. The infection of the meninges as well as of the general circulation took place through the agency of the small osseous veins with or without sinus thrombosis. This path of infection has lately been automatically confirmed by Hinsberg.

The operation was undertaken notwithstanding the meningeal symptoms, as it was possible that these symptoms were caused by a reactive serous exudation, circumscribed meningitis, or an extradural abscess. Accordingly we felt compelled not only to expose the frontal sinus, but also to explore the cranial cavity. The operation was done too late. The fall in temperature, the improvement in symptoms,

and the good general condition of the preceding day seemed to warrant the delay. In another case I should be inclined to operate earlier. The method of removing the anterior wall by an osteoplastic flap proved to be an excellent one, and enabled us to explore the posterior wall with facility. The transillumination as a diagnostic aid was a failure, yet it showed us the extent and shape of the frontal cavity, which served us in making the bone flap.

In 1900, Killian had collected eight cases of acute sinus suppuration with intracranial complications. Of these eight cases very few have run such a fulminant course as the above described one and the case of Huquenin, 1882. The latter case is the only one which Kuhnt, in 1895, could find as an example that acute conditions of the nose and frontal sinus might lead to a fatal meningitis.

STATISTICAL REPORT ON THE RESULT OF THE EXAMINATION OF A SECOND SERIES OF DEAF-MUTES.

(THIRD SUPPLEMENT TO THE HEARING POWER OF DEAF-MUTES.)

By Prof. F. BEZOLD, Munich.

(With Plate IX. of Vol. XXXVI. of the German Edition.)

Abstract by H. Knapp.

THE further experience derived from his regular service as attendant aurist to a deaf-mute institution has strengthened in the author the conviction that an aurist should be connected with every one of these schools. Apart from opportunities for scientific research in various ways, the requirements for treatment will justify it abundantly.

First we must not forget that the chief contingent of deaf-mutes in these institutions still suffer from diseases of the ear and its adnexa, chiefly from recurrent middle-ear suppurations requiring the aurist's care.

Secondly, the exact examination of the hearing function will have to determine of which kind and degree of education the pupil is capable. Upon the remnants of hearing and their position in the scale, as well as the auditory acuteness, especially when the duration of perception is examined with the continuous-tone series, depends the pupil's capacity of learning to speak.

One hundred and eighteen deaf-mutes were examined, of which 28% were totally deaf, 15% had only one island of hearing left, 6% had tone gaps, *i. e.*, interruptions in the series of tones they had preserved, and a greater number had

larger or smaller tone defects in all parts of the scale. Their variety is recorded in great detail, with tables and explanatory remarks. The objective changes found in examination of the different parts of the organ, membrana tymp., etc., are treated with the same painstaking thoroughness. Disturbances of equilibrium, vertigo, unbalance, and nystagmus could be produced by long turning in only 16% of the totally deaf, but in over 80% in the partially deaf. To learn to understand speech, the perception of tones from b^1 to g^3 is absolutely necessary, as is evident from the statistical proofs presented in tables and elaborate explanations. In this respect the position of the vowels and consonants is very important. It is of interest to know that according to the investigations of Oscar Wolff, Donders, Helmholtz, and of A. Herrmann and Marage, the vowels and most of the consonants lie within this interval.

Plate IX. illustrates the narrowest tone intervals for the vowels and consonants which Bezold has found in his examinations of deaf-mutes. For the comprehension of speech the duration of hearing has proved more important than the range of tone perception. The knowledge of both is the most reliable guide in selecting those pupils that promise the best results from instruction in audible speech. Still more important than the range of audition is the smallest amplitude of vibration (tone intensity) that is perceived at the expiration of the range of audition. Bezold recommends to educate the deaf-mutes in two separate institutions, the one for those where there is no prospect of learning to speak, the other for those where the examination of their hearing capacity proves their chances to be encouraging.

The editor is sorry that our space limit does not permit a full translation of this, the third article of Bezold on this subject in these ARCHIVES. His researches in this line are exceedingly interesting and suggestive. They have been proved fundamental also in a kindred field, psychology, furnishing biological data of the brain functions, of which we may mention two recorded in the present article, namely (1) a modification of Helmholtz's theory of tone sensations by

Ebbinghaus (in his *Grundzüge der Psychologie*, 1897), and (2) a communication of Liepmann, who reckons one of Bezold's patients among the few well-authenticated cases of word deafness, calling it an example of Lichtheim's "subcortical sensory aphasia" (see Liepmann, *Psychiatrische Untersuchungen*, herausgegeben von Wernicke, Sept. 7–8). Bezold himself accepts both these cases as not fully conclusive.

ON DISEASES OF THE EAR IN HYSTERICAL SUBJECTS.

(REMARKS MADE DURING A DISCUSSION UPON HYSTERIA.)

By Dr. VOSS, Riga.

Translated and Abridged by Dr. Julius Wolff, New York.

As assistant in the general hospital in Riga I was brought in contact with many severe forms of hysteria and was greatly impressed by the manifold ways in which this malady shows itself. At that time I saw the following case:

I.

A female visitor to one of the patients was taken with an hysterical attack. A part of her previous history, obtained from her physician, was to the effect that one morning she had noticed an ill-smelling discharge from her left ear, which had come on suddenly without previous pain. She was right; there was a foul-smelling fluid in the left ear, which on examination proved to be a mixture of fæces and urine that she had poured into her ear.

An analogous case was observed by me some years ago:

II.

This was an elderly married lady of the best society who belonged to a degenerated family, being hysterical herself. She complained of severe pains in the left ear, tinnitus, and marked deafness. Opposed to this was the statement of her husband, made immediately before, during her absence, who said his wife was so nervous that she was annoyed by the rustling of a newspaper which he was reading two rooms distant. Examination

was entirely negative. Some years before I was consulted by the same patient on account of a copious discharge from one ear, which was said to have begun during the night and abundant traces of which were shown to me upon the pillow.

I found the external meatus dry, without any dried up secretion, the membrane pale and shining, and hearing excellent. On several more occasions she came to me with other hysterical complaints referred to her ears.

We have here, on the one hand, a plain woman of the poorer class, and, on the other hand, a lady of the best society, who both professed to a physician to be suffering from an ailment that did not exist. The cause for this was in each case the same, namely, hysteria. Both cases furthermore resemble each other in that the intended deception was so awkwardly practised that the disclosure, or, in other words, the diagnosis, was very simple to make, for inspection alone sufficed to establish the falsity of the statements. These coarse deceptions on the part of hysterical subjects are, indeed, well known, so I will only refer to a case of Haug, an hysterical woman who plugged both her ears with pebbles in order to be able to say that she was entirely deaf and suffered great pain.

III.

A similar example was the case of a young lady of seventeen years who complained for some time of difficulty in breathing through her nose. She readily assented to my suggestion to cauterize the moderately hypertrophied inferior turbinated bodies. No sooner was the electric circuit closed than she fell into a faint that had the appearance of an hysterical attack. This made me inquire more closely into her history for evidence of hysteria, but the patient denied ever having had any previous ailment. Her family physician, however, informed me that she had frequently had severe hysterical seizures. The treatment used for the nasal trouble was therefore an entirely indifferent one, although with each slight cold the patient desired that the turbinates be cauterized. When this was refused she exaggerated her symptoms, claiming the occlusion of the nose was intolerable, although she freely blew through the nose when told to remove some mucus that was supposed to interfere with the examination. She did not

appreciate that thereby she was betraying herself. Two years later she suffered from eczema and furunculosis of the external meatus on each side, which were accompanied by an hyperæsthesia of the skin as far as the clavicle on one side and below the breast on the other. The suggestion to open her mastoid quickly caused this hyperæsthesia to disappear.

An interesting feature of this case, apart from the awkward manœuvre to simulate an obstruction of the nose, was the fact that the patient dissimulated her hysteria, or carefully avoided making any statements concerning the same.

Thus the above history shows that the anamnesis obtained from the patient herself is not sufficient, as it may be incorrect in one particular or another. Whenever possible it should be obtained directly from the physician in charge or the family physician, before we decide upon an extended treatment.

IV.

In February, 1898, a mother brought her eleven-year-old son to me. One and a half years before, the boy had complained of his ear, and on account of a mild injection of the tympanic membrane the diagnosis otitis media had been made. Later other symptoms followed: headaches, disturbance of vision (monocular diplopia and narrowing of the field of vision), and a neurosis of the knee-joint, all hysterical in nature. When I saw the boy this time he was again thought by his mother to have an otitis media, there being complete deafness, severe pain, but only a very slight injection of the drumhead. All symptoms disappeared at once on my assurance that not only this ear trouble but also the former one had been of a purely nervous character.

There are two other points concerning simulation that must be touched upon, which may be of importance in determining the treatment in any given case, namely false temperatures and hemorrhages.

In regard to the former, I do not refer to the mere statements of the patient that there is fever, but to temperatures actually measured, perhaps by the physician himself, with his own thermometer. Only very slight tricks on the part of the patient may cause the clinical thermometers now in

general use to record very high temperatures. It is not possible to expose all these tricks of the patients, but I will mention just a few.

The extreme temperature of 109.4° was reached by a patient who used the thermometer to stir her coffee. Another used his burned-out pipe to warm the thermometer until he once reached 111° when he was detected. Strongly rubbing the thermometer upon the bedclothes may accomplish a similar result. A very simple method is merely to quickly tap the thermometer with the finger while it is in the axilla or the rectum, which will be effective provided the bulb end is horizontal with or higher than the other end.

Such deceptions are practised by patients desiring an operation, even though it be a dangerous one, if other means, such as claiming to have severe pain, have been of no avail.

The question of hemorrhages is sometimes a ticklish subject, when we are called upon to distinguish between spontaneous bleeding from an uninjured ear and simulation. The untrustworthy character of the statements of hysterical subjects is further evidenced by the two following striking examples.

V.

The history of this patient was given to me by Dr. Berkholz. She had complained of rheumatism, which was healed ; then a left-sided hemianopsia. Soon spontaneous hemorrhages occurred, first from the nose, then from the left ear and one eye. As they continually recurred the patient became weaker and weaker until she was taken into a clinic. Here daily hemorrhages kept up from the nose, left ear, and the caruncles of the eyes. No wounds of any account could be seen, and patient became still weaker. Then the urine became bloody, but the patient would not permit catheterization. She was chloroformed and pure urine drawn from the bladder. Examination of the vagina revealed a large darning needle, which was carefully returned to its hiding-place and the patient was transferred to a room where she was watched night and day. The hemorrhages continued, but she could not be caught in the act of producing them as she always drew the blanket over her head first. The needle was taken away and the hemorrhages ceased.

VI.

The next case was a woman who had suffered from some tuberculous process in her youth and was kyphotic. For the past ten years she has been deceiving one physician after another. Two of them were deceived by her bringing to them large amounts of blood which she asserted came from her mouth, simulating in one instance hemoptoë, in the other an hematemesis. Then she succeeded in having her mastoid opened by feigning a mastoiditis. Everything was found normal. A year later I find my friend in the hands of a physician trying to save her life during a hemorrhage after removal of a posterior turbinated tip. When I told him she was a simulant, he became indignant. Later she produced for his benefit the following symptoms: pain in the neck and outside of it, then a whole wreath of clear vesicles, later a conjunctivitis that would not cease, which turned out to be caused by small particles of lime which were always present in spite of frequent removal. Then came headaches with loss of hair in bunches, which she demonstrated by pulling out a handful. It was found to have been cut off close to the scalp. In the hands of other physicians she later passed successfully through the diagnosis of tuberculosis of the intestines and of the larynx; also a tracheotomy. A few weeks after I last saw her on the street she was brought into the hospital unconscious and died the next day. All organs were found healthy except for an emphysema and œdema of the lungs and a fatty liver, probably due to phosphorus poisoning.

This case ought from the beginning to have been in the hands of a single specialist, a neurologist. The more we treat such people locally the more their desire grows to impress us in our own domain. We encourage simulation by entering upon the treatment. The main thing is to make the diagnosis of hysterical simulation and leave the rest to the nerve specialist. It is our duty towards the patient.

Let us now pass to the pure functional neuroses that may be located in the ear. They can best be designated as sensory disturbances, divided into anæsthesia and hyperæsthesia of the sensory nerves on the one hand, and of the auditory nerve on the other.

Absolutely pure functional neuroses, without any discov-

erable disease of the ear at all, seem to be rare. This may be explained by the extreme frequency with which aural lesions are to be found and in the preference with which functional neuroses are located in such parts as have already attracted the attention of the individual. Therefore most cases which on hasty examination appear to be pure neuroses will, on closer examination, turn out to be mixed forms.

VII.

A young lady with severe hysteria was brought to me years ago. The ear could hardly be examined, for she drew her head away, claiming the speculum caused unbearable noises. Sensation of the skin was normal. Tuning-forks, vibrating so feebly that I could hardly hear them, were unbearably painful for her. Weber's test with forks c, c′, and c‴ produced the same result, while c″ was not heard at all, no matter how hard it was struck. Hearing of voice and watch more than normal.

This appeared at first like a pure case of acoustic hyperæsthesia, until examination with various forks revealed the tone-defect.

In cutaneous hyperæsthesia the pains are frequently exaggerated to such a degree that the diagnosis is quite plain. The slightest touch or the mere proximity of the finger to the ear causes the patient to draw away, although sometimes we may succeed, while his attention is taken up with something else to press real hard without causing pain. To the sensitiveness to touch there may be added spontaneous pain, or the latter may exist by itself and then we have otalgia or mastalgia. In these cases a wrong diagnosis may be of serious consequence in causing unnecessary surgical procedures.

VIII. AND IX.

These were two cases who complained of most intense otalgia and mastoid tenderness whereas examination of the ear showed normal conditions. In both the mastoid was opened on account of the pain, but no disease was found. The second case sacrificed her ear-drum and her hearing through the operation.

As examples of the direct causes that provoke such hyperæsthesias I adduce four cases.

X.

In the first of these a fall from a wagon, producing no discoverable injury to any part of the body, was followed by intense earache, fever (that was not measured by the physician himself), and disturbance in walking. The mastoid was opened and everything found normal.

XI.

A very young nurse had charge of a severe mastoid case that died of sinus thrombosis, and right after that of another small earpatient. A week later she complained of intense earache, though the parts appeared normal. Reassurance did not improve her condition, but a dose of bromides and valerian did so very quickly.

XII.

In this case the provocation was a box on the ear, received by a nurse from a patient. She complained of severe pain, first in that ear, then in the other, and again in the first. At the same time sensibility of the skin on the upper half of the left side of the body was much diminished. In a short time the symptoms subsided. This case makes the impression of a pure traumatic neurosis, or rather hysteria brought to the surface by a traumatism.

XIII.

Very similar to the last was the case of a young governess who was struck on the ear with a thin kid glove by her pupil. The pains became intense and hearing was lost, but examination revealed no trace of inflammation or injury.

Two more cases of traumatic neurosis may be cited to serve as a text for the discussion of the treatment.

XIV.

A young lady of twenty-five years in stooping accidentally ran one branch of her spectacles into her right ear. She immediately became very deaf, not only on the right but also on the left ear; loud noises and giddy feeling in the head. Examination the

same day showed a small injury to the roof of the meatus, but the membrane was intact and anæsthetic. The deafness on the left ear soon vanished, but that on the right persisted a long time; and now, as I think back, I cannot free myself from the belief that the fact that I continued to treat her contributed thereto. Several times I sent her to a nerve specialist, but she did not go. That my first diagnosis of a neurosis was correct was proved a year later, when she again came to me, completely deaf on both ears and with the "same terrible noises" in the right ear. And what was the cause this time? In a narrow street she had passed close to a pair of horses and one of them snapped at her. This time she believed my assurances that the trouble was merely due to fright and demanded no further treatment. The deafness gradually disappeared of its own accord.

XV.

A better result was obtained in the treatment of a young Russian woman who came to me in the greatest excitement. In a turbulent speech she stated that her whole career was threatened and ended with the statement that she had just become deaf from a blow on the ear. Inspection revealed a fresh rupture of the left membrane. Owing to the patient's excited condition I did not mention the same, but merely spoke of a small superficial injury that would heal in a few days. The next day she no longer mentioned her left ear, and on the third day was very much disgruntled because I still occluded it. This ear, she said, was entirely well, but the right one could not hear. For her excited condition I prescribed bromides and valerian and in two days she came to thank me, as she was feeling entirely well, though the perforation had not yet healed.

Besides the rupture of the left drum membrane there was in this case a traumatic neurosis of the right ear. I am firmly convinced that I would not have attained this favorable result if I had first lectured to her about the rent in the membrane. She would not after that have believed my statement that such openings heal without serious results.

In passing now to the therapy of these conditions I wish first to make mention of a fact well known in medical literature. In every volume of neurological periodicals you may

read of cases in which, after an hysterical attack or some other inducing cause, deafness and aphasia remained, which after a longer or shorter time disappeared. And what has been the treatment? Almost never interference by specialists. From these facts we must conclude that pure functional neuroses of the ear will in many cases be cured if treated only according to the precepts of neurotherapy and not by specialists. I even go so far as to assert that it is our duty to transfer cases of this class to the neurologist. I consider all local treatment contra-indicated and believe that even frequent local examination may make still firmer the patient's conviction that there is local disease. More particularly still are operations upon the nose or of the ear contra-indicated, for thereby we only injure the patient.

Thus far I have spoken only of patients in whom no objective signs were to be found in the ear. I now come to a second group in which objective signs in the ear are visible, but can only be regarded as manifestations of the general neurosis. *Angioneurotic appearances* in the skin and mucous membranes are a well-known though unusual picture of hysteria. According to Gradenigo they appear as œdema, hyperæmia, and anæmia, hemorrhages and trophic disturbances. I therefore wish to draw attention to otoscopic pictures which may readily lead to wrong diagnoses and their consequences.

XVIII.

A nine-year-old boy suffered for three or four days from very severe pains in his left ear, so that he wailed night and day in spite of narcotics. There was no fever, the mastoid was tender, not swollen and its skin unchanged. Ear drum shining, darker gray than on the other side, not injected, not bulging. Hearing diminished.

I was struck by the active assiduity with which the boy, who had just then been moaning in bed, left the same and sat down to be examined. He was an only child with hereditary taint. The father died in an insane asylum and the mother—well, she will appear sufficiently in this history. The patient was taken into the hospital where for three days the pain and appearance of the drum remained the same. Believing that I was deal-

ing with a serous otitis, I performed a paracentesis, but to my surprise found no exudate. The cut healed in twenty-four hours but there was no change in the condition. An ice-bag was applied, followed by improvement and then suddenly relapse into the former condition. The nurse now reported that the relapse was due to the following: the mother had been well pleased with the ice-bag because it drew out so large an amount of matter from the ear. When the nurse laughingly said that this was only melted ice-water, the dissatisfaction and aggravation immediately appeared, especially when the nurse or the physician entered the room. While listening at the closed door one could hear mother and son quietly conversing, even laughing. A nerve specialist was called who diagnosed hysteria and ordered the boy to leave the bed and exercise; and now the music began. We were called rough and heartless in presence of the boy, who asserted he could not walk and always fell to one side, invariably finding, however, a ready support on the cross-bar of a window without touching the glass. The assurance that the boy could be cured, but only if the mother went off on a trip, was answered by the coarsest invectives, directed against us.

XIX.

A woman of thirty, who had been suffering for a year from hysterical paraplegia, complained suddenly of severe pain in the left ear. Marked hyperæsthesia over mastoid; over the middle of its convexity a small sensitive nodule like a gland; membrane shining, not bulging, dark gray in color, mild radial injection. Hearing normal. When I percussed with my finger over the mastoid that was so very sensitive, the patient repeats monotonously the words: "Sehr ángenehm, sehr ángenehm, sehr ángenehn" [very pleasant], the accentuated syllable always coinciding with the tap. If a tap is omitted she simply says: "Sehr án—" and pauses till the percussion is continued. Simple reassurance caused the symptoms to disappear by the next day and the membrane was again pale as on the other side.

In both of these cases as in others that I have seen, the actual color of the membrane was still gray. But the injection may be so pronounced that the general impression will be that of red. In that case the lustre of the surface is also lost and the reflex gone. In still more marked cases the

drum looks bright red and swollen as in acute otitis media just before perforation. The outlines of the hammer disappear and only the short process is visible.

XX.

A woman of forty-five years presented the appearance last described, together with severe otalgia. I treated her palliatively as a case of acute otitis media for three days, and, as the condition did not improve, performed paracentesis into a tympanic cavity containing only air. In twenty-four hours the incision closed, no secretion appearing on the occluding gauze, but the conditions were the same as before. I now emphatically stated that the trouble was only a nervous one and not an inflammation, and prescribed bromides and valerian. In twenty-four hours the membrane appeared normal and the pain was gone.

I was inclined to attribute the dark gray color of the membrane in the milder cases, and the marked injection of the severer ones, to hyperæmia of the tympanic mucous membrane. This, however, is not correct, for through the gaping incision in the drum I could make out a quite pale mucous membrane, anæmic rather than hyperæmic, covering the inner tympanic wall. The main injection, according to my observations, is only in the superficial vessels in the epidermal layer of the membrane. An injection of the mucous layer of the tympanic membrane seems to me improbable, for in that case the other tympanic vessels would likewise be injected.

After these experiences, gleaned from paracentesis in the cases under consideration, I have arrived at the conclusion *that the objective picture of acute otitis media may be a pure symptom of hysteria.*

XXI.

In the case of a young governess, her physician had diagnosed acute otitis media with pain, injection of the drumhead, and deafness, and performed a paracentesis without any discharge showing. Though the membrane became pale, mastoid tenderness supervened, and I was consulted. I found normal hearing, a dark gray

drum, slight œdema over mastoid, and hypæsthesia of the surrounding skin when tested with a pin-point. I diagnosed hysteria, which opinion was confirmed by further investigation into the previous history and the subsequent course of the ailment.

In regard to the diagnosis of this class of cases, which, I believe, has not yet been described, I have the following remarks to make:

Above all, it is important to trace any existing hysteria or hereditary taint by a careful study of the patient's previous history. In Case XX. my failure to do so led me into a wrong diagnosis and the performance of a paracentesis. Since it is possible, however, for acute otitis media to occur in a patient who gives a history of hysteria or hereditary taint, it is necessary to add to the anamnesis proof of the actual presence of hysteria at the time. The disturbances in cutaneous sensation will serve as an aid in this.

The hyperæsthesia of the skin of the mastoid may in many cases extend diffusely over the whole process without there being any particular tenderness over the region of the antrum. It is especially important to find when this hyperæsthesia is not limited to the mastoid region, but extends beyond its boundaries, sometimes as far as the median line of the neck in front, or even to the breast. I have already pointed out that this hyperæsthetic zone is sometimes less sensitive on firm pressure than superficial touch.

In other cases there are pressure points, but I have never found them to correspond with the antrum or mastoid tip. These points of greatest sensitiveness are more apt to be over small nodules on the convexity of the mastoid process, or over the trunk of the occipital nerve where it pierces the muscles far behind the antrum, but the pain has not the character of a neuralgia of this nerve.

Anæsthesia, which, as I am told by neurologists, is a conspicuously frequent condition in these cases, is also not limited in its extent by the boundaries of the mastoid process. It may also be so variable that it can be present to-day, absent to-morrow, and again present a few days later. In several cases I was struck by the absolute painlessness of

the paracentesis, and am inclined to attribute this to anæsthesia of the drum.

As regards the deafness, I noticed that in spite of the assertion that the ear could hear nothing, the head would be drawn away when a loudly vibrating tuning-fork was brought close to the ear unexpectedly. This test succeeds only once, however, for the head is not withdrawn the second time.

In testing bone-conduction the fork is not heard at all on the mastoid process, and in Weber's test it is lateralized either to the healthy side, or not at all. It is unusual to meet with the statement that the fork is also heard on the affected side. In no case was the fork heard persistently louder on the affected side, as in acute otitis media. The tube is always perfectly patent, and there are moist râles with inflation.

This brings me to the therapy, and I now again emphasize that operative procedures are contra-indicated. I have received the impression that those cases which are handed over to the neurologist take the most favorable — that is, the shortest course, whereas the longest course is taken by those which have already passed through several hands, especially if the subject of opening the mastoid has already been broached. The fate of the patient lies in the hands of the first physician consulted; if he makes the diagnosis correctly, quietly, and without wavering, the course will be a favorable one.

XXII.

The harmful effects that may follow even a paracentesis I saw in a man fifty-nine years of age. There was hyperæsthesia extending over the whole left side of the neck down to the clavicle; but if the patient's attention was drawn away, the sensitiveness was not present. The other symptoms also pointed towards hysteria, and I referred the patient to a neurologist, but instead he went to a well-known otologist. The latter performed paracentesis, and a discharge appeared—not immediately, however, but a few days later. The mastoid process became tender, and also had to be opened. Besides that, the patient underwent an eye operation and then demanded an intestinal operation. The latter was not performed, but the patient was sent home.

Inasmuch as the main purpose of this article is to safeguard hysterical subjects against operative interference, I will select from the very profuse literature on hysteria only those cases which pertain to painful affections of the mastoid process, because these most often lead to surgical intervention.[1]

A striking example of the craving of hysterical patients for operation is offered by the case of a seventeen-year-old girl with old double scarlet-fever otitis. As the latter did not yield to prolonged treatment, I suggested a radical operation, to which she readily consented. There was no history of hysteria. The operation of the right ear and the healing took a normal course, but the after-treatment lasted four months. During this time the patient complained of pain in the head, and demanded operation of the other ear. When she awoke from the narcosis of this operation she had a typical hysterical attack, and now the trouble began. She complained of increasing and unbearable headaches on the side last operated upon and of fever, measured by herself at home. Temperature was normal whenever measured by a physician. After four months the wound healed, but the complaints persisted, and occasionally there were moderate elevations of temperature. A neurologist who was consulted confirmed the diagnosis — hysteria, but admitted the possibility of a cerebral abscess. Although warned of the dangers of an operation, the patient insisted, and a trephining and exploration of the brain was performed, with a negative result. Healing uneventful. But the patient did not yet have enough and succeeded, during my absence, in having another trephining performed. Now she has been married for a number of years and is healthy.

I believe that in the foregoing case the long treatment, extending over one and one half years, and especially the operations, were the direct inducement to the outbreak of the hysteria to which the patient was predisposed. I have therefore come to the conclusion that when we have decided that an operation must be performed in an hysterical patient, it is all important not to describe the same as dangerous to

[1] Cases XXIII. to XXXVII. inclusive are taken by the author from literature to illustrate instances of ear operations performed on hysterical subjects.

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life, or even at all dangerous, but to make the prognosis favorable in order not to burden the patient's mind any more than necessary.

I now come to the last point, namely our present method of after-treatment of operations; I mean the custom of tamponing the wound which is still in general use. The long duration of these painful or at least sensitive manipulations makes them a source of torture for nervous people, and especially nervous children. Zaufal was first to omit unnecessary tamponing of the wound after acute mastoiditis, except in its lowermost portion, by suturing the wound, if there were no complications in the brain or sinus. The average period of healing in 87¾%, of the cases was 26½ days, which is a splendid result.

As regards the radical operation for chronic cases it is, indeed, our present custom to suture the wound, but we continue for months to tampon through the meatus. Zarniko has proposed to substitute for tamponing the complete filling of the cavity with boracic acid. Acting on this suggestion I have left the tampon out after the fifth day, nor did I put in boracic acid thereafter.

XXXIX.

A nineteen-years-old girl suffered since childhood from an intermitting discharge, following scarlet-fever otitis, and a radical operation was demanded and performed. Examination of the cutaneous sensation had resulted negatively. The antrum was found to be no larger than a pin-head. A cutaneous flap was made from the lower portion of the meatus, the posterior wound sutured, and a tampon inserted through the meatus. Change of dressing on the fifth day, removal of sutures, primary healing. There now was a complete hemianæsthesia of the body on the operated side, in other words, hysteria. Thereupon the tampon was removed from the ear and not renewed, but merely an outer dressing applied. This ear healed in one month without any secretion whatever, and the whole cavity was lined with delicate epithelium.

In this case the anæsthesia, which was certainly not present before, only appeared after the operation. I have mentioned

the case mainly to show what results may be obtained without tamponade. Not one drop of discharge flowed from the external meatus, though, of course, touching the granulations with a little cotton revealed small traces of a mucoserous fluid.

This course was, to be sure, an exception, the rule being that there is a more or less abundant purulent secretion from the external meatus which is to be removed daily, or every few days, with some dry cotton on a carrier. No powder need be insufflated, protection being afforded by an outer sterile dressing. In the cases in which no fetid secretion existed before the operation, the secretion remains odorless; but, if it was fetid, daily irrigations through the auditory meatus should be made. Sometimes the odor remains to the end and ceases only when epidermization is completed.

Now, what is going on meanwhile in the tympanum, the antrum, and the meatus?

He who has for years been accustomed to tamponing finds a condition that seems to him horrible — granulations everywhere, no good survey of the parts as we are accustomed to in a wound held open by the tampon. The temptation ever exists to use the sharp spoon or curette or, at least, the nitrate-of-silver stick. But I must strenuously warn you against any such interference, for thereby you will spoil your good results. If you will once have the courage to watch quietly for a month or two, you will be surprised at the result. Slowly and gradually the granulations contract and are covered with epidermis in many places ere we suspect it.

At the end the auditory meatus will not show much more than the normal width. In the antrum the same process takes place — gradual epidermization and cicatrization. In the tympanum we find either that the mucous membrane is covered by epidermis, or that a delicate membrane has been newly formed just as in the old treatment.

A prime requisite for this favorable course is the free exposure of the aditus ad antrum, so that no adhesions will form. This is the only place in which, judging from my experience, a granulation is apt to remain when the rest of the cavity is healed over. In that case I simply remove it

with a snare, and soon obtain cicatrization. Conducted in this way the after-treatment is made as painless as possible, and is readily borne by children as well as adults.

In briefly summarizing what I have dwelt upon in the foregoing, I conclude that:

1. *The objective picture of an acute otitis media may appear as a symptom of hysteria.*

2. *Pure functional neuroses of the ear should be treated, not by an otologist, but by a neurologist.*

3. *In these cases an absolute contra-indication exists against too much treatment, especially of the nose and pharynx.*

4. *The generally well-known craving of hysterical subjects for operations may also centre upon the ear (and probably also upon the nose).*

5. *Opening the mastoid process to relieve the mastalgia of hysterical patients is absolutely contra-indicated.*

6. *Our present method of after-treatment of radical operations with prolonged tamponing is not at all suitable for children or nervous and hysterical patients. After the fifth day the tampon is entirely superfluous and should be replaced by a simple outer dressing.*

THE INVOLVEMENT OF THE GASSERIAN GANGLION IN MIDDLE-EAR SUPPURATION.

By DR. ROBERT HILGERMANN, Breslau.

Translated by Dr. Arnold Knapp.

THE treatment of the intracranial complications following otitis has been furthered by the exact knowledge of the various preformed channels by which the inflammatory process extends from the middle-ear cavities to the skull. We know that certain paths are followed more frequently than others, and that they cause well-characterized symptoms. Again, we know that in the case of certain channels of infection definite forms of intracranial conditions are to be expected. During the past year a great deal of care and time has been spent on the study of these connecting paths, yet we find that some relations are not sufficiently explained. Among these is the way by which an inflammatory process extends from the middle ear to the region of the Gasserian ganglion, though von Troeltsch in 1868 drew attention to these relations, and they have been very recently compiled in a comprehensive manner by Koerner. It has been my privilege to examine cases, largely in the Royal University Clinic for Diseases of the Ear, Nose, and Throat, and in the private hospital of Professor Kuemmel, which may throw some light upon this subject.

It seems proper first to review the anatomical relations. According to F. Krause, the trunk of the V. nerve passes under the site of the attachment of the tentorium cerebelli

and directly under the superior petrosal sinus through an aperture in the dura mater, which is always larger than the nerve itself and is more closely connected with it. From this aperture on for the remainder of its intracranial course, which is situated in the middle cranial fossa, all branches of the V. nerve are extradural; in other words, between the dura mater and the base of the skull. Near the apex of the petrous pyramid, on its upper and anterior surface, there is a depression (impressio trigemini) which is covered by the dura mater in the form of a tent, thus forming a confined space which extends anteriorly in the middle cranial fossa between the base of the skull and the dura mater. This is the cavity of Meckel, or of the semilunar ganglion. In this cavity the Gasserian ganglion may become affected by inflammatory processes in the interior of the petrous bone. A well-known path is one leading through the pneumatic spaces of the petrous bone. These pneumatic spaces, which in general are only to be found in the mastoid, may present an unusual development and may even occupy the entire pyramid. Merkel says that these petrous cells may be so extensive as to surround the labyrinth up to the aqueduct of the vestibule, and more than half the entire pyramid may be replaced by air cells.

Urbantschitsch has described the communications between these pneumatic cavities and the interior of the skull as follows: Near the tympanic ostium of the tube, sometimes in its upper half or somewhat farther back on the inner tympanic wall, there is frequently a small bony defect, which in one of my specimens presented a diameter of $2\frac{1}{2}$*mm.* This opening leads into the pneumatic space surrounding the tympanum and the labyrinth, and extends to the apex of the pyramid. A bristle introduced in this defect may be passed to the apex of the pyramid and there it can be seen through a very thin bone. In some specimens this thin bony plate at the apex of the pyramid presented small defects, so that a direct communication existed. Fluid injected into the defect in the tympanic wall would appear in the cranial cavity at that point. Hence it seems probable that pus could follow the same path. Even if no defects

are present, this very thin plate of bone surely can not offer much resistance, and the inflammation would then pass directly to the ganglion. The lower surface of the ganglion is not separated from the bone by the dura mater, but by a very thin periosteal connective-tissue layer.

The cases where extension has followed this path seemed to be extremely rare; I have been able to find only the following cases mentioned in literature.

I.—von Troeltsch reported a case of a woman who complained of regularly recurring attacks of fever, with severe shaking chills and headache. On admission patient was in the sixth month of pregnancy. Five days later a purulent discharge was discovered coming from the right ear which was said to have existed for three years. The number of chills increased; the entire oral region became œdematous; the pupils were unequal. On the second day the patient became delirious; a normal labor took place on the thirteenth; the symptoms about the ear increased in severity, and under the picture of pyæmic infection death ensued after two days.

At autopsy there were purulent phlebitis of the transverse sinus, two extradural abscesses on the anterior surface of the petrous bone, and a perforation of the bone at this site; subperiosteal abscess on the mastoid process. The drum was thickened but intact. The tegmen tympani presented a defect in the roof of the antrum. At this point there was a quantity of yellow inspissated pus, and the mucous membrane was directly in contact with very much thickened dura. The antrum was full of pus; a fistula led from the attic through the upper meatal wall. The pyramid is normal in its middle part, but at the apex, about the situation of the Gasserian ganglion and the cavernous sinus, it is discolored.

The author thinks that the purulent inflammation of the Gasserian ganglion originated in the otitis, and claimed to have observed two similar cases.

II.—Ostmann has reported a case of middle-ear suppuration which died shortly after the mastoid had been opened. The cause for this fatal termination is believed to have been an extension of the pus along the Gasserian ganglion, as the

autopsy revealed pus up to the apex of the petrous pyramid, where it had broken through and surrounded the ganglion.

The following case was observed in our clinic.

III.—**Acute relapse of a healed middle-ear suppuration; disease of the mastoid process; perforation of the pus through the tympanic cells to the fovea for the trigeminal ganglion; meningitis.**

W. M., thirteen years old, had, after measles, at age of four, otorrhœa from the left ear. During the last two weeks the otorrhœa was accompanied by headache, fever, vomiting, vertigo, with a tendency to fall to the right. On admission T. 39.8°, P. 88 to 100. The head is held more or less in a fixed position, though all movements are passively possible without pain. The anterior and posterior margins of the mastoid are very tender, as well as the insertion of the sterno-mastoid muscle; the canal is filled with fœtid pus, which accumulates rapidly.

Operation.—The antrum was opened and the mastoid cells were found filled with pus; the antrum contained pus and granulations; the tegmen seemed solid; the sinus and the dura of the middle fossa exposed; both appeared healthy, though the bone on the posterior surface of the antrum appeared softened. The sinus was incised, but contained fluid blood. Distinct rigidity of the neck continued; high fever and other marked meningeal symptoms ensued, and the patient died on the following afternoon.

Autopsy.—Extensive meningitis; sinus free. On examining the apex of the pyramid, the Gasserian ganglion was found bathed in pus. On retracting the dura in the region of the fovea, the dura could not be recognized as such, but was replaced by soft granulations. At this place a very delicate connective-tissue band, perhaps a nerve, perforated the bone and passed into a cavity mentioned below. The ossicles were normal and imbedded in hypertrophied mucous membrane. From the floor of the hypotympanic recess a system of pneumatic spaces filled with pus and granulations passed inward between the jugular fossa and labyrinth, then proceeded inward and forward to the apex of the pyramid. The previously mentioned thin area of bone at the fovea trigemini corresponded to the inner wall of a large air cell which surrounded the carotid canal and was filled with pus.

Evidently the inflammation passed along the delicate fibrous band to the cavity of the Gasserian ganglion.

In the following case of Buerkner it is uncertain whether the semilunar ganglion was affected in a similar manner.

IV.—Patient had suffered from left otorrhœa for eight days and facial paralysis for three days. There was a perforation in the posterior and lower quadrant, with granulations, which were removed. The symptoms were thereby relieved, but after a month the pain returned in the left ear with greater severity, and the discharge was diminished. Then nystagmus, paralysis of the VI. nerve, neuralgia — all branches of the V.,— vomiting, and stupor set in; death ensued from exhaustion.

At autopsy an adhesion was found of the anterior extremity of the left cerebellar lobe to the posterior surface of the petrous bone directly behind the passage of the V. nerve. At the site of the adhesion a grayish mass extended along the V. nerve to the pons, and between the pons and the cerebellum to the medulla. On incising the pons directly beneath the exit of the V. nerve an abscess as large as a cherry was exposed. On the upper margin of the petrous bone there were three carious places. The petrous bone posterior to the antrum and above the sigmoid bulb showed a number of yellowish-white masses, situated in cavities with smooth walls which communicated with the skull at the aforementioned carious places and were connected with the vestibule. The grayish mass just described extended, together with the nerve, into the internal ear.

It seems that in this case the infection passed along the V. nerve and produced one of those rare abscesses of the pons. It is, however, difficult to say how the infection extended from the original cholesteatomatous suppuration to the semilunar ganglion. The cholesteatoma had unquestionably invaded the labyrinth, and it cannot be excluded that the extension took place along this route.

The following case of Schwartze is even more indefinite.

V.—The patient was admitted to the clinic on July 11th on account of severe pain in the ear. Nothing abnormal was found beyond a slight hyperæmia of the drum. Paracentesis evacuated

no pus. After a slight improvement death suddenly took place on July 17th.

Autopsy.—Diffuse meningitis. The drum and tympanum were found normal. There was a puriform collection between the dura and the petrous bone near the Gasserian ganglion. The cochlea, the vestibule, and the semicircular canal contained a sero-purulent fluid.

In this case we can at least assume with certainty that the meninges became infected by way of the cavity of Meckel. The author emphasizes the fact that there was no collection of pus in the internal auditory canal, but that the trigeminal ganglion was imbedded in pus. It is impossible to say whether the pneumatic spaces in the petrous spaces were an agent in this case, as no special examination seems to have been made. In these cases it is necessary to think of a mode of infection of the semilunar ganglion, which is more complicated, and has not been described, namely, the transmission through the carotid and cavernous sinuses. The otitis media may lead to a phlebitis of the smaller blood-vessels which pass from the tympanum through the carotico-tympanic canaliculi to the venous plexus surrounding the carotid.

According to Krause the Gasserian ganglion rests with its anterior part not directly upon bone, but on the outer wall of the cavernous sinus. The first branch of the V. nerve is intimately associated with this venous channel, as it together with the III. and IV. nerves are situated in the reduplication of the dura mater, which forms the outer and upper wall of the sinus. We have found that a part of the ganglion itself is very closely related to the wall of the cavernous sinus, hence it seems likely that the ganglion and generally the root of the first branch and its surrounding loose connective tissue can become infected from the sinus. In fact this appears to occur quite frequently. Phlebitis of the cavernous sinus with circumscribed or diffuse meningitis has often been observed. In these cases it has generally been assumed that the infection of the subdural space has followed directly from the upper wall of the cavernous sinus.

This upper wall, however, is very thick and scarcely suited to transmit an inflammatory process. In our case (No. VI.) this upper wall of the sinus was not changed, but the delicate connective tissue was purulently infiltrated, suggesting the possibility of a transmission to the meninges. Hence we must regard the infection of the ganglion as a middle step between the phlebitis of the sinus and the meningitis. The following two cases from our clinic seem to support this possibility. I was unable to find analogous cases in literature.

VI.--**Old chronic otitis media. After radical operation meningitis with orbital symptoms on the opposite side. Meningitis from diseases of the V. nerve.** (*From the carotid and cavernous sinuses?*)

A. K., nineteen years old, was suddenly taken with pain in the right ear four years ago, which ceased with the onset of the suppuration. The pain recurred from time to time and lately attacks of vertigo were noted. Treatment seemed to be without result. Granulations were repeatedly removed with the curette. Radical operation was done on *Oct. 7th.* The bone was found sclerosed. The antrum was small and deep. The hammer was found imbedded in granulations. The external semicircular canal was not diseased.

Shortly after the operation patient complained of vertigo. On the following day twitching of the facial set in with nystagmus on looking to the left. Severe headache. Very slow pulse, occasionally intermitting. T. 38.2°.

Oct. 8th.—Nystagmus and vertigo less. P. 62, intermitting at every fifth beat. Pain and rigidity of the neck and Kernig's contracture noted. The dressing was changed, and in addition to some pus in the wound there was a discolored area present on the external semicircular canal. T. 37.8°. Very restless and pain in the back during the night.

Oct. 9th.—T. 38.7°, P. 64. The left pupil dilated. On sitting up, vertigo and rigidity of the neck. Another operation was undertaken and the wall of the middle cranial fossa was found affected. Puncture of the posterior cranial fossa proved negative, while that of the middle fossa withdrew a quantity of meningeal fluid. An attempt to enter the vestibule miscarried, as the

sinus was displaced anteriorly and the antrum was very narrow. The external and posterior canals were opened and the labyrinth fluid escaped. During the operation the facial nerve twitched repeatedly. Soon after, left ptosis, photophobia. Great restlessness. Pain in the neck; then stupor. T. 39.3°.

Oct. 10th.—The left eyeball is somewhat restricted in its movements upward and outward. The other symptoms continue. T. 38.6° to 38.7°, P. 102 to 122.

Oct. 11th.—Great restlessness and delirium. Eye-grounds normal. Right-sided VI. nerve paralysis. The diagnosis of meningitis at the base seemed assured, so that no further operation could be undertaken. Pulse rose to 142.

Oct. 12th.—Ptosis and chemosis, left. Epistaxis. Blood is vomited. Beginning optic neuritis. Condition remained about the same, and patient died on Oct. 15th.

Autopsy.—Extensive meningitis. Transverse sinus contains normal blood. The cavernous sinus and its connecting venous vessels of the dura are infiltrated with pus. On exposing the Gasserian ganglion at the apex of the petrous bone, pus escaped. The left orbital roof is removed and pus is seen to have extended along the sheath of the III. and VI. nerves in the orbital tissue.

Below this membranous diaphragm, which appears like a secondary drum, and below the tensor tympani, there is a blind cavity which forms the external margin of the tube. This contains thickened pus. There is another blind cavity between this and the lowest part of the Eustachian canal, which is not connected with the tympanum, but communicates by a small opening with the other cavity. As no pus was found in the internal auditory meatus, it must be assumed that the infection travelled to the meninges not by way of the labyrinth, but through the tympanic cells. The part of the cavernous sinus adjoining the sixth nerve was found to be thrombosed and the wall of the carotid presented some unusual features. Though the lower and anterior part of the wall has its normal color, the posterior and upper is a dark bluish-red. This peculiarity is probably due to the fact that it is this portion of the cartoid canal which adjoins the diverticula previously mentioned. Microscopically the vessels of the carotid sinus presented a great number of hyaline thrombi, but no purulent infiltration. The wall of the carotid itself was normal. The cochlea and semicircular canals contained a quantity of recent purulent exudate. The auditory nerve showed a small-celled infiltration.

In this case repeated attacks of vertigo occurred. After the operation symptoms appeared which made the diagnosis between meningitis and cerebellar abscess uncertain. At the subsequent operations no cerebellar abscess was found. The attempt to open the vestibule did not succeed. Meningitis soon became evident.

The autopsy revealed a phlebitis of the sinus on the diseased side, which had extended to the healthy side, and had affected the orbital veins accompanying the VI. and III. nerves. The place where the infection of the sinus took place could not be made out, though it seems most probable that the inflammation extended along the carotid sinus. Without question the concussion from the chiselling of the very hard bone acted powerfully in the transmission of the inflammatory process. This would explain the meningitis appearing directly after operation.

In the following case the path of the inflammatory agent also could not be determined with certainty.

VII.—**Acute otitis with protracted mastoid disease; extensive operation on the mastoid, with wounding of the dura; death from meningitis forty-eight hours later; thrombus of the carotid sinus; meningitis transmitted by the cavernous sinus and the cavity of Meckel.**

G. A., fifty-eight years old, has suffered from pain in the left side of face for six weeks. Three weeks ago left-sided otorrhœa set in and paracentesis was performed three times. The pain became more severe, and on admission to the hospital on August 10th, the patient appeared very ill. T. 37.6°. The left canal filled with pus; the drum reddened and protruding in the posterior segment, where pus, under pressure, issued forth from a small perforation. The mastoid tip was sensitive.

Operation, September 11th.— The mastoid cells contained granulations. After removing the bone near the sinus, a large quantity of thick pus suddenly escaped, but there was no extradural abscess. The entire mastoid was diseased and had to be removed, and on completion everything below the antrum had been removed. The posterior surface of the petrous bone was then removed to explore the cerebellar dura. In doing this the

dura was injured and an entirely normal brain surface protruded. Temperature in the evening, 37.2°; pulse, 90. The patient complain of slight pain and some pressure in the occiput. During the night an unusual irregularity of the pulse was noted. September 12th, at half past five P. M., T. 38.8°; pulse, very irregular; vomiting; headache; no rigidity of neck; patient was composed. In the course of the evening, the typical picture of meningitis developed and death followed on the following morning.

Autopsy.—Diffuse meningitis. The internal auditory canal is free from pus, but the ganglion is surrounded by quite a quantity. The dura is everywhere very thin. The accidental opening corresponds about to the opening of the aqueduct of the vestibule. There is no purulent collection at this point. About the fovea trigemini the bone presents a very dark red discoloration. The surface is everywhere intact. The tympanum appears filled with pus and swollen mucous membrane; the ossicles are in place. At the inner angle the thickened mucous membrane extends right up to the carotid canal, at which point the wall of the latter is very thin and hyperæmic. It is impossible to say whether an actual defect existed. The carotid wall at this thin place shows a very distinct bluish color, as if the small vessels were dilated with blood. This change is continued on towards the brain, and extends along the posterior and upper walls up to the point corresponding to the anterior surface of the fovea trigemini. At this point, as has been noted before, the pyramid shows the very dark red coloring, which can not be brought into connection with the tympanum. As far as can be determined microscopically the internal ear seems healthy. Portions of the internal ear were examined microscopically, and the veins were found to contain hyaline thrombi, but no bacteria could be found.

The unusually rapid termination of this case after operation for acute otitis is very interesting. Within 24 hours the diagnosis of meningitis was evident. At autopsy the internal auditory canal was normal, but the Gasserian ganglion was found imbedded in pus, so that it seems probable that the latter was the transmitter of the infection. This transmission could have taken place through disease of the pneumatic petrous cells, as in Case V. We found the bone in this region discolored, but no direct communication through pneumatic cells could be established. The carotid sinus

was found to be situated unusually near to the floor of the tympanum, and exhibited a striking bluish color. We were not able to find a distinct perforation from the tympanum into the carotid canal, though the presence of the thrombi in the veins is to be regarded with suspicion. Unfortunately the condition of the cavernous sinus was not noted. It cannot be denied that the injury to the dura may have been the cause of the meningitis, except for the fact that we know that such consequences are extremely rare, and we are inclined to believe that in our case the meningitis existed before the operation.

It has been shown that under certain circumstances the operation for otitis media may be followed by meningitis through transmission of the semilunar ganglion in a most complicated manner. This fact is not new, but it does not seem to have received much attention.

Clinical symptoms, in all of our cases pointing to an involvement of the V. nerve, were absent, though it cannot be said that these were especially looked for. It is not improbable that we can frequently find anæsthesias or neuralgias which may give us a clue, and the question then presents itself, What can be done in the way of treatment in these cases? If the symptoms show an involvement of the V. nerve, the Gasserian ganglion could be extirpated and the cavity of Meckel could be exposed according to the method of Hartley-Krause. Perhaps it may be possible in this way to prevent the onset of fatal meningitis. However, such a procedure is very difficult, and before we are entitled to try it a certain number of dubious points must be explained; our own cases are not convincing. It would be important to determine by autopsies whether a collection of pus in the cavity of Meckel, as we have presupposed, could secondarily infect the arachnoid sac, or whether the retention of pus in this cavity is simply a secondary factor in an inflammation of the subdural space.

Another point is to determine the part which labyrinth disease plays in these cases. In one of our cases and in the case of Schwartze and Buerkner the labyrinth was surely involved. In the case of von Troeltsch and in our cases Nos.

III. and IV. a microscopical examination was not made and labyrinth disease cannot be excluded.

We hope that this paper, necessarily incomplete, may serve that greater attention be paid to the points in future at autopsies.

THE INMATES OF THE WESTPHALIAN PROVINCIAL DEAF-MUTE INSTITUTE, AT SOEST, PRUSSIA.

By Dr. A. DENKER, of Hagen.

(*With Plate X . of Vol. XXXVI. of the German Edition.*)

Abstract by Dr. H. Knapp.

THIS extensive report is made according to the Bezold methods of examination, with the practical object to determine which of the pupils were suitable to be taught by the ear, and which by the method of articulation.

1. **Etiology of the difficulty.** The number of the pupils was 64; 38 boys, 26 girls. In 16 the difficulty was congenital, in 32 acquired, in 16 doubtful. Meningitis (cerebro-spinal, spasms) was present in 16 cases, in most of the others otitis purulenta media et interna could be recognized. A table of all the cases presents the results of the objective examination of the auditory organ; adenoid vegetations were found in 29 cases.

2. **Perception of pure tones** (illustrated by Plate X.). 25 (40 %) were perfectly deaf in both ears.

Hearing rests:

I. *Islands* up to 2½ octaves, in 31 ears among 21 persons.

II. *Tone gaps*, 7 ears in 7 persons.

III. *Large defects* in the *upper part* of the scale, with preservation of the whole lower-tone part, 4 ears in 3 persons.

IV. *Larger defects* in both *upper-* and *lower-tone limits*, 4 in 3 persons.

V. *Large defects* in lower-tone limits, with slight sinking of the upper limit, 3 ears in 3 persons.

VI. Small defects in both upper and lower limits, 15 ears in 10 persons.

The result was that 16 pupils possessed (in one or both ears) sufficient hearing capacity to be suitable for improved instruction.

3. The examination for the **perception of the human voice** with unclamped forks was carried out in detail. By those pupils that could hear one or all words, the faculty of hearing tones from b^1 to g^2 was present.

[The gray stripe in the plate, that interval which, according to Bezold, is never wanting in deaf-mutes that learn to speak by the ear.]

The examination has demonstrated that the perception of all tones is more or less diminished in every case where the tone perception of a part of the scale is totally obliterated, showing that in such cases the destructive process extended to all parts of the inner ear that are concerned in audition.

4. The **objective examination** prompts the author energetically to plead for the necessity of treating the chronic suppurations with all the means of modern otology.

5. **Disturbances of equilibrium,** including nystagmus, were noticed in all degrees of deafness; absent in total deafness.

6. **Pathological conditions of the eyes** do not show any connection with deafness.

7. The "**aphasic pupil of the Institute,**" eleven years old, had been admitted to the Deaf-mute Institute because he could not speak, though his hearing was normal. His mother died of morphinism, which was fully developed when he was born. No pathological condition found, except adenoids in a moderate degree. The functional examination showed good perception of all the tones of the scale, also normal duration of perception. He understands whispered words and speaks them correctly, but somewhat hesitatingly and laboriously. He, therefore, does not suffer from sensory aphasia, where the patient hears what is

spoken, yet can neither understand nor repeat it, but he suffers from *atactic* or *motor aphasia*, where a central defect prevents the patient from speaking though he hears and understands well and has normal phonetic conditions. Owing to the articulation method, in which he had been trained the last four years, he repeats what he hears correctly, though awkwardly, in the deaf-mute speech.

The diagnosis of a defect in the left cerebral hemisphere was made more plausible by the presence of disturbances in the right extremities, both of which were somewhat paretic, and there were occasional spasms in the right arm. Agraphy and alexy are absent; the boy writes and speaks spontaneously. His brother and sisters, who all were born before the mother's sickness had developed, are perfectly healthy.

REPORT OF THE TRANSACTIONS OF THE NEW YORK OTOLOGICAL SOCIETY.

By Dr. ARNOLD KNAPP, Secretary.

MEETING OF MAY 27, 1902. THE VICE-PRESIDENT, DR. EMERSON, IN THE CHAIR.

Presentation of Patients.

Dr. Wilson presented a patient whom he had seen on February 1st, and who had suffered from **otorrhœa** for six months. Next seen March 22d, when he had pain in the left ear, cerebral symptoms, temperature went to 104°, became somewhat comatose, with stertorous breathing; could be roused, but answered "Yes" to all questions; occasional lightning-like involuntary contractions of facial muscles; eyes normal; no rigidity of neck; no paralysis nor mastoid symptoms. At 8 P. M. same day the left antrum was opened. Antrum found small and healthy. The dura over the external auditory canal was exposed to the extent of 2 x 1½ inches. It appeared healthy above, below seemed discolored. A crucial incision was made, letting out a slightly milky fluid with a few fine shreds in it. The inner membranes appeared semi-opaque, the opacities being thickest along the lines of blood-vessels. He regarded it as a case of purulent leptomeningitis, and thought the prognosis was very grave. The temperature, however, went to normal, the cerebral symptoms disappeared, and the patient recovered.

Dr. Kipp inquired what was the condition of the dura mater over the tegmen tympani.

Healthy. The route of affection was not discovered.

Dr. Brandegee asked whether the pus was examined bacteriologically.

Dr. WILSON replied that streptococci had been found in the discharge from ear a month before operation.

Dr. ARNOLD KNAPP inquired what the hearing was before operation.

Dr. WILSON said it was practically obliterated.

Dr. BERENS raised the question as to the propriety of operating on patients in a comatose condition.

Dr. KIPP thought we should not operate under any circumstances without consent. He also asked whether any change appeared in the meningeal condition in the after-treatment.

Dr. WILSON replied that the meninges became more opaque.

Presentation of Specimens.

Dr. TOEPLITZ presented a specimen of a **brain and temporal bone,** which he had removed at autopsy from a patient with the following history: The patient, a young woman, was first seen December, 1901, suffering from otorrhœa of seventeen years' standing after diphtheria. The aural condition was that of caries, or left middle ear, with cicatrix of right *Mt.* Five months later, owing to persistent headaches, it was decided to do a radical operation. The left mastoid was found sclerosed, and there was no antrum. On proceeding into the middle ear through the canal, facial twitching repeatedly occurred upon mere probing. The method of Stacke was followed, and the dura was accidentally exposed over the superior wall of the canal. After operation, the temperature did not rise above 100° during the first four days. The wound did not do well. There was considerable odor. The temperature rose on the fourth day slowly, to 103° on the seventh day, the pulse-rate to 100–110, respiration 20–22. Eyes normal, cerebration clear. On the ninth day the opening into the middle cerebral fossa was enlarged, and carious bone and granulations were removed. On the eleventh day the temperature went to 105°, with cerebral symptoms. An attack of facial erysipelas had set in, and was recognized on the eighth day. Dura bulged; it was incised on the thirteenth day, and a probe evacuated pus. At autopsy a purulent, diffuse lepto meningitis localized to the frontal lobe of the brain was found on the left side. The base of the temporo-sphenoidal lobe showed in its anterior half a certain amount of darkened disintegrated brain substance, and posteriorly a cavity which was recognized as a superficial abscess. Mastoid and post. wall of meatus removed.

Perforations leading into post. cerebral fossa. Opening 1½" through the tegmen tympani leading into middle cerebral fossa. Fallopian canal in aditus exposed; cholesteatoma in middle ear; Pus oozed from oval window.

Dr. TOEPLITZ was inclined to regard the erysipelas (streptococcic infection) as the factor in the fatal termination, though he thought it was difficult to decide this point.

Dr. KIPP said he had had a case which died of meningitis complicated with erysipelas, where it had been impossible to determine which had caused death.

Dr. KENEFICK asked whether there was any complication from the kidneys. No.

Voluntary Contributions.

Dr. HARRIS related a case of **double mastoiditis with meningeal symptoms** in a woman of thirty-eight. When admitted, there was intense swelling of both canals, mastoids tender, temperature 102°. No pain. Tinnitus very marked, hearing much reduced, and a sense of pressure at the base of the brain was complained of. No history of previous ear trouble, though she had been treated by family physician for pulmonary tuberculosis. A broad paracentesis was performed, and ice-coils applied to the mastoids. The eyes were normal. Streptococci present in pus. Symptoms remained unchanged. Then, after a chill, temperature rose to 104°. Patient became delirious on fourth day. Both mastoids were opened, and found extensively disintegrated. The dura and sigmoid sinuses were exposed. The subsequent course was marked first by continuation of the cerebral symptoms. Mastoid wound remained very dirty. Then general improvement set in, the canal swelling diminished, and there was complete recovery.

Dr. CLEMENS said he had seen the patient, and was struck with the very pale condition of the mucous membranes, suspicious of tuberculosis.

Dr. BERENS spoke of three cases of **simple mastoiditis** on which he operated, complicated with malaria. In the first case the plasmodium was found, in the others the temperature reacted to quinine. He called attention to the unpleasant and puzzling complication malaria furnished in these cases, especially regarding the temperature. The patients recovered.

Dr. CLEMENS inquired whether the quinine had any deleterious effect on the mastoid wound. None.

Dr. EMERSON asked whether any unpleasant sensations from the quinine were noted. None.

Dr. ADAMS recollected a case where he had opened both mastoids and the temperature rose to 104°. The patient recovered under quinine.

Dr. KENEFICK asked the locality of the patients.

It was replied that one lived in New Rochelle and the others in this city near tunnel excavations.

Dr. STEPHENS, as guest, related a successful operation in a case of **brain abscess.** The patient was seen Oct. 1st, with pain in right ear; upper part of drum bulged and was incised, evacuating slight amount of pus. Mastoid was tender and there was some fever. Ice-coil applied and canal irrigated. On the following day the bulging had recurred, the drum was again incised without result. Pain continued. The mastoid was opened and found absolutely normal except that it was unusually vascular. The pain continued after operation. Temperature 100.4°; patient drowsy. On Oct. 23d, projectile vomiting set in. Pulse 66; choked disc, right more marked than left; reflexes normal; patient still drowsy. On 24th, pulse 56. Radical operation was performed and the superior and posterior walls of the canal removed. The dura under the squamous portion was exposed and found thickened. Incision was followed by the escape of 3 to 5 oz. thick pus. The wound was simply packed. In the subsequent treatment there was no irrigation and no drainage tubes were employed. After a certain length of time the packing was found to have been forced outside the opening, which was regarded as a healing process and the gauze was not reinserted. Complete recovery.

Dr. EMERSON asked whether pain was a conspicuous feature. It had been constant and severe.

Dr. HARRIS inquired whether any localizing symptoms had been present.

It was replied that though the size of the abscess was such as would lead us to expect localized symptoms, none were present. The question of aphasia could not be determined.

Dr. BRANDEGEE inquired whether the opening over the squamous portion had been made continuous with the opening in the upper wall of the canal—in other words, whether the zygomatic

arch had been removed. He considered this an important point and was inclined to favor a separate opening through the squama for the treatment of brain abscess for the purpose of insuring this new opening from contamination by the mastoid wound.

Dr. ADAMS wanted to know why the sudden filling of the abscess cavity was not suspicious of secondary abscess.

Dr. STEPHENS thought it was not the case, because there had been no secretion.

As regards the operation and its site, Dr. KIPP thought the method should depend on whether there existed disease of the tegmen tympani or not.

Dr. LEWIS thought that the anatomy of the parts should be borne in mind, namely: the bony floor of the middle fossa is on a much lower level than any portion of the squamous plate of the temporal bone above the linea temporalis. For this reason an abscess situated low down in the temporo-sphenoidal lobe can not be drained as well, if an independent opening is made above this line, as when the floor of the middle fossa is removed.

Dr. BRANDEGEE related another case which he regarded as late infection. The patient had suffered from acute otitis of two weeks' standing, due to staphylococcus infection. He apparently got well and then returned with a subperiosteal abscess. At operation a perforation was found at the masto-occipital suture, the mastoid process was completely destroyed, sinus exposed, and a large epidural abscess exposed.

Dr. LEWIS said he had had two similar cases, where, after an acute purulent otitis media, the drum membrane had healed and the inflammation in the tympanic cavity had entirely subsided. Nevertheless, in one case two weeks later, and in the other case three weeks later, subperiosteal abscesses developed. In both cases at the operation epidural abscesses were found. In one case a number of perforations were found in and about the masto-occipital suture, and the whole inner plate of the mastoid process was necrotic, which upon removal revealed a very extensive epidural abscess, with granulations covering the underlying sinus and dura. Both cases made uneventful recoveries.

Dr. KIPP objected to the term "late infection" and thought that this was only a case where the symptoms had been latent for a time.

Dr. LEWIS related the history of a case of **brain abscess** in a young girl four years of age. The child was admitted to the New

York Eye and Ear Infirmary on March 29th last. The history of a long-continued foul-smelling discharge from the right ear, with the development, some ten days previous, of a swelling behind and above the ear, was obtained. The child was prepared for immediate operation.

The mastoid incision was extended upwards to and above the parietal eminence; this was made necessary because of the existence of a large subperiosteal abscess, filled with a most foul-smelling pus and occupying a space extending upwards (from the mastoid tip) over three inches and from one to one and a half inches in width; the periosteal walls were gangrenous. The bone over a small area immediately below the parietal eminence was of a purple-red color (evidently a beginning necrosis). The mastoid cells were opened and much cholesteatomatous material evacuated; the posterior canal wall was removed and the tympanic cavity curetted of all granulations; the usual flap was made from the membranous external auditory canal. The dura was exposed above the tympanic roof and found to be normal. Because of the necrotic condition of the periosteum the wound was left open throughout its entire extent.

Notwithstanding the fact that the child was a puny specimen of humanity and did not possess much recuperative power, the wound made fair progress towards healing. Suddenly, while sitting up in bed on the morning of April 22d, the child collapsed. When Dr. Lewis reached the patient, a few hours later, she was unconscious, with a pulse of 120 and a temperature of 106° F. No paralyses nor anæsthesia were present. The patient was prepared for another operation. The opening made at the first operation in the tympanic roof was enlarged until it extended upwards and backwards towards the parietal eminence a distance of about three inches and was about one inch in width. The dura mater immediately above the tympanic roof, which had been exposed at the first operation, was covered with healthy granulations and the dura mater on further exposure was found to be healthy from a half to three-quarters of an inch beyond; as the area of bone, which at the first operation was seen to be of a purple-red color, was approached, it was found to be softer and more friable, and immediately under the centre of this area was found a perforation in the dura mater; the granulations covering the latter were most exuberant at this point. Through this perforation pus exuded and a grooved director passed two inches into the brain before it

met with resistance. The dura mater was incised, with the liberation of some non-odorless pus and a small amount of blood clot. On introducing a cephaloscope into the abscess cavity, its bottom was found to be filled with a blood clot; it was concluded that this clot was the result of a recent hemorrhage and the cause of the collapse a few hours previous and so was not disturbed.

Following the operation, the case was dressed daily until the fifth day, when, but little pus being present, the blood clot, with the aid of the cephaloscope, was removed. Dr. Lewis was surprised as the last piece of blood clot was removed to find the lumen of the cephaloscope fill up with a clear fluid; by means of cotton-tipped applicators rapidly used he was able to stop the flow sufficiently long to obtain a view of the bottom of the cavity, which was smooth and of a pinkish white color; the fluid rose and fell with each inspiration and expiration; the descending horn of the lateral ventricle undoubtedly formed the floor of the cavity.

A week later, as only cerebral fluid was exuding from the cavity, the gauze drain was removed and on the next day the cavity had closed. The child is now up and is gaining in weight and strength daily. A small hernia cerebri is still present. The abscess was in all probability situated in the posterior portion of the first temporo-sphenoidal convolution.

Dr. HEPBURN said that he had the opportunity of examining this deep opening in the brain with the cephaloscope and was also struck with the curious condition of the wall of the lateral ventricle.

Dr. A. KNAPP related a case of a **foreign body** in the **canal** and middle ear which he had been called upon to treat. The child had come to him after attempts at extraction had been made elsewhere. The foreign body appeared as a black mass situated very deep in the canal. The external auditory canal just external to the foreign body was swollen and granulating. Under ether and with the aid of a long hooked instrument it was possible to break up the foreign body which proved to be a bean, and extract it in fragments. After removal the drum membrane was found completely absent. The promontory wall lay bare and denuded of membrane and the surface anterior to it contained granulations. From the outer wall of the attic a thin process of bone hung down, but it was impossible to say whether this was the long process of the malleus or incus. The subsequent course

of the case was uneventful, except that vomiting existed for a day and later a slight otorrhœa developed. Dr. KNAPP wished to know the opinion of the Society as to what indications should immediately precede the detachment of the auricle for removal of foreign bodies.

Dr. KIPP thought the most important element was patience on the part of the operator; that he always succeeded in removing foreign bodies through the canal.

Dr. ADAMS thought the auricle should be detached only as a last resort.

Dr. HEPBURN related a case in which he had been forced to make an incision behind the auricle to extract the foreign body.

Dr. HARRIS also told of a case where it had been necessary to detach the auricle to remove a foreign body; the case terminated fatally on the third day.

Dr. BRANDEGEE spoke of a glass bead which was situated in the canal and which it was impossible to remove without detaching the auricle.

Dr. EMERSON thought the instillation of oil of great service in the removal of foreign bodies in the canal.

As illustrating Dr. Kipp's remarks upon the utility of waiting in these cases, Dr. DUANE cited the case of a small boy who came to him with a mass of putty in his ear, which had been inserted a month before and which was as hard as stone. It was lodged firmly in the bottom of the canal, and covered the entire drum membrane. Attempts at removal even under ether were entirely futile. After antiphlogistic treatment kept up for a couple of days, the swelling of the parts subsided, and the mass was readily removed by the syringe.

REPORT ON THE TRANSACTIONS OF THE SECTION ON OTOLOGY OF THE NEW YORK ACADEMY OF MEDICINE.

By Dr. JOSEPH KENEFICK.

STATED MEETING HELD THURSDAY, MAY 8, 1902.

JAMES F. MCKERNON, M.D., in the Chair.

Mastoiditis with thrombosis of the lateral sinus — ligation of the internal jugular vein — recovery.

Dr. EDWARD B. DENCH: The patient whom I have the pleasure of presenting before this Section was first seen by me on November 11, 1901. She had been suffering for a number of weeks from acute suppurative otitis media, involving both ears, the right ear being more extensively involved than the left. When I first saw the patient, both ears were discharging; the right mastoid process was excessively tender, the left but slightly tender. It was decided that immediate operation was necessary upon the right mastoid process. The patient was placed upon the table, and the typical mastoid operation was performed. The entire cortex was removed, and the mastoid cells were found to be extensively broken down in every direction. During the operation, the dura of the middle cranial fossa was exposed over an area of about a half an inch in diameter, and the lateral sinus was exposed for a length of three-quarters of an inch above the knee. Upon both palpation and inspection, the sinus seemed to be perfectly normal; it was, therefore, not opened. As the patient had only been under my observation for about three-quarters of an hour prior to the operation, it seemed unwise to open the sinus for exploratory purposes, the vessel having the appearance of being perfectly normal, as before stated. All carious areas were removed from the mastoid, the tip was taken away, and free communication was established between the mastoid an-

trum and the middle ear. The ordinary antiseptic dressings were applied, and the patient was returned to bed. A free incision was made through the left membrana tympani, at the time of operation, in order to secure free drainage, and to abort what seemed to be a beginning mastoiditis. The subsequent history of the case was uneventful. Under regular irrigation, the discharge gradually became less and less from the left ear, and finally disappeared altogether, all mastoid tenderness having completely vanished at the end of forty-eight hours after incision of the drum membrane. The operation wound upon the right mastoid progressed favorably, and the patient was discharged from the hospital about four weeks from the time of operation. After that time she came regularly to the out-patient department of the hospital, to have the wound dressed, and seemed to be doing well until the middle of January, at which time she began to complain of severe pain in the head. At this period, she thought she had some fever. On examination the wound seemed rather foul and some granulation tissue was curetted away. There was considerable tumefaction of the tissues of the neck below the lower extremity of the mastoid incision. Careful probing failed to reveal any pus. The dressing was reapplied and the patient was sent home with instructions to report the next day. Two days later I saw the patient, and as she seemed to be quite ill, I advised her to come into the hospital; this she did on the following day, January 17th. At the time of her admission the temperature was normal; three hours later the temperature rose suddenly to 105°, and the patient had a pronounced chill. I was at once notified, but as I wished to observe the temperature curve, I advised no medication. The temperature dropped suddenly to normal on the morning of the following day, but in the afternoon at six o'clock it registered 105°, and one hour later it was 106° in the mouth and 107° in the rectum. In the meantime, the blood had been examined for plasmodium malariæ, but no organisms had been found. An examination of the blood also failed to reveal the presence of leucocytosis. In spite of the fact that there was no increase in the number of white blood cells, I decided that the temperature could only be due to infection of the sinus, and, therefore, decided to do an exploratory operation, having for its object the exposure of the sinus in the original wound. For this purpose the patient was placed upon the table, and under ether anæsthesia the original wound was opened and the sinus exposed. It was found to be filled with a soft clot. The curette was

introduced downward toward the jugular bulb, and removed considerable broken-down blood clot. Free hemorrhage did not follow the use of the curette. I therefore decided that there was a clot in the vein below the bulb, and immediately proceeded to excise the internal jugular. The vein in the neck was exposed throughout its entire length, from a point just above the clavicle to its entrance into the base of the skull. Two ligatures were passed about the vein just above the clavicle and the vessel divided between them. The entire vein was then rapidly dissected out. Low down in the neck the vessel contained fluid blood. The tributary thyroid and laryngeal branches were considerably enlarged, and it was necessary to ligate them before dividing them. The vein seemed to be normal in structure until just above the point where the lingual and facial veins were given off. Above this point the vessel was so much thickened, that it resembled more the internal carotid than the internal jugular. It was only possible to distinguish between the two vessels by knowing the relative position of each. After the common lingual and facial trunk had been divided between two ligatures, two ligatures were passed about the internal jugular at the base of the skull, and the vessel divided between them. The walls of the vein close to the base of the skull were almost a sixteenth of an inch in thickness. The lumen of the vein was much narrowed and contained a soft clot. The muscular structures within the wound were then united by interrupted catgut sutures, the superficial wound was closed by interrupted silk sutures, and the wound healed almost entirely throughout by first intention. There was slight breaking down of the wound just at the point where the lingual and thyroid veins were given off, and at another point just above the clavicle, corresponding to the region where the proximal end of the vein was ligated. Localized infection of the tissues undoubtedly took place at these points through the infected blood which escaped when the vessels were divided. The temperature fell immediately after operation, and remained normal for four or five days. At the end of this time it rose abruptly to 104°, and for several days the evening temperature was high. This was undoubtedly due to small collections of pus in the regions already mentioned. As soon as the pus was evacuated from these localities, the temperature became normal, and the patient made a good recovery.

This case is instructive because it illustrates the necessity of eternal vigilance in the management of cases of this kind. From

the fact that the patient did perfectly well for about eight weeks after the first operation upon the mastoid, I am convinced that secondary infection of the wound occurred owing to careless dressings, and that this wound infection was transmitted to the sinus, causing thrombosis of that vessel. At the time of primary operation the sinus, as I have said, was normal, and in the primary and in all subsequent dressings performed while the patient was in the hospital the sinus wound was carefully isolated, by gauze packing, from the focus of infection within the mastoid and middle ear. At the time of the secondary infection, about the middle of January, two months after the primary operation, all discharge from the middle ear had ceased. It is, therefore, impossible to assume that secondary infection of the sinus took place from the middle ear. The only other possible avenue of infection must have been through the granulating mastoid wound.

I, therefore, want to insist that it is necessary for the utmost care to be exercised in the dressing of all mastoid cases, especially those in which the lateral sinus is exposed during the operation. It must be remembered that the slightest lack of proper aseptic precautions may cause infection of the sinus in these cases, even at a very late period. No patient is absolutely safe until the wound has completely closed.

A recent Stacke operation illustrating the result of wound closure by buried sutures.

Dr. WENDELL C. PHILLIPS: This patient came to the clinic at the Post-Graduate Hospital about one year ago. All methods known were used to bring about a cure of her chronic suppurative otitis media, which dated from early childhood, the result of an attack of scarlet fever. There has been a continuous suppuration from that time, and she is now nineteen years of age. There was necrosis of the annular ring and a general necrosis of the attic. I finally told her she would never recover unless she submitted to a radical operation. She readily gave her consent. There was no sign of mastoid disease. On the eleventh of April a classical Stacke operation was performed, *i. e.*, separating the ear and forcing the whole ear forward and commencing the operation at the annular ring. I used the Stacke director. I did not open the mastoid cells. After curetting thoroughly I divided the skin of the posterior wall of the canal and pushed one section well up into the attic and anterior cavity. I then closed the periosteum

over the wound with catgut sutures. Afterwards I brought the other surfaces together with chromicized catgut, the ten-day chromicized catgut as prepared by Van Horn & Company, of this city, applying the sutures subcutaneously without coming through the skin at all, and in this way I avoided any chance of suture abscesses or scars. Six days afterwards the whole wound had closed and united, and to-night the scar is very slight. The result in the ear has been that, to my surprise, dermatization had commenced in the region of the attic and has quite advanced. So much of the posterior wall was forced outwards that there now is a small section of bare bone on the posterior canal wall. The patient now states that "there is almost no discharge." I brought her here especially to show the beautiful-looking scar resulting from the use of buried sutures.

Two cases illustrating the effect of wound closure by buried sutures.

Dr. TALBOT R. CHAMBERS, of Jersey City: When I heard that Dr. Phillips intended to present a patient showing the result of wound closure by buried sutures I thought I would present these two patients. In one, a mastoid operation was done three weeks ago. This child, ten years old, at birth was injured with forceps and has had a running ear which I had tried for eight years to cure without avail, and the mother said she wished an operation, which I performed, and found cholesteatoma in the attic in contact with the facial nerve. In this other case a mastoid operation was done. I brought the patients to show the results of the buried sutures. In both cases the wound appears as an unwrinkled straight line and is to be greatly preferred to the interrupted sutures; besides, on its removal a gentle pull removes the whole suture after it has accomplished its object, of coapting the wound surfaces.

Dr. T. PASSMORE BERENS: I do not know yet whether the Doctor brought the patient to illustrate the unusually quick healing from the Stacke-Schwartze operation, or the buried suture that has been so long in use.

Dr. W. P. BRANDEGEE: I should like to ask the Doctor if, in acute cases, this method of closing the wound is always applied.

Dr. T. R. POOLEY: Whilst there is nothing new whatever in such a method of closing the wound, still I think that in acute mastoid operation it is bad surgery. The cases that are shown

here are exceptional to the general rule, although I believe such a procedure is applicable to the Stacke operation.

Dr. PHILLIPS: I should like to ask regarding the acute cases, whether he packed with gauze or not, or did he close it up completely without packing. In my experience blood clots break down and, therefore I should prefer packing the wound in its lower part and closing it all but its lower portion, so allowing for drainage.

Dr. CHAMBERS: The wound was closed almost down to the bottom. The tip was taken away because there was a breaking-down mastoid, although it was an acute case. The wound was thoroughly cleansed after the operation, and there was no discharge. To-day the hearing is not very good.

In Jersey City, in cases where the pus is sanious, or staphylococci or streptococci or pyocyaneus are present, singly or combined, we generally expect to leave a little opening at the bottom of the wound at the region of the tip. If it is thought that we could make a large opening through the posterior wall of the auditory canal we then close up entirely the skin wound behind the ear. A large percentage of our mastoids are thus treated. And the resulting scar is scarcely perceptible six months later.

Dr. W. H. BATES: I have done a great many Stacke operations and sewed the wounds. I am very much interested in the cases presented by Drs. Phillips and Chambers, showing the use of buried sutures. If this is done for the purpose of preventing the formation of a scar, I do not see that we gain much by using catgut sutures; my cases heal within a week with not any more of a scar than is shown by these cases. After one month, or two at the most, there is no line of incision noticeable. I believe that my good results were obtained because I used a very fine silk suture such as was first introduced by Dr. G. T. Stevens for stitching the eye muscles, No. ooo black silk. When fine silk is used I have never observed in any of my cases the formation of a single stitch abscess.

Dr. JAMES F. MCKERNON: I should like to ask with regard to the Stacke operation, if there ever was given a history of a previous mastoid operation.

Dr. PHILLIPS: I could not get any history of a previous mastoid involvement, but I am inclined to believe that every chronic suppurative condition with extensive necrosis is the result of an original antrum or mastoid involvement and, if proper operation

had been performed, would have been cured. But, in this case, there was given no history of such a condition, and I found no evidence of mastoid involvement being operative.

In answer to Dr. Bates, I must say that I agree with him, but the wounds in the skin do not disappear until after a long time. This form of stitching, for the time being, is much more pleasing. I should like to suggest to the members that if they intend using this plan there are but a few preparations of catgut that can be used, for they must be prepared very carefully. I use the chromicized catgut as prepared by Mr. Van Horn,—what he calls his ten-day catgut.

Dr. CHAMBERS: I seldom use catgut, preferring boiled silk. When I intend to remove it I withdraw it about one-quarter of an inch from the wound and cut it off; the other end is then withdrawn by pulling, and the patient seldom knows when it is out. A presbyopic can remove it in this way without glasses.

Extensive epidural abscess.

Dr. W. P. BRANDEGEE: Typical cases are not infrequent, and some of the interesting complications observed often deserve more than a passing comment; this explains my reasons for presenting this case. Among the most interesting features about this case of epidural abscess are: (1) the problematical source of the infection; (2) the immense destruction of tissue involved, and (3) the anterior zygomatic cells, tip cells or antrum were not involved in the acute inflammatory process.

The patient, sixty-one years old, came to Dr. Dench's clinic on the 3d of January last, giving the following history. For five weeks he had suffered pain in the left ear, and for the past two weeks it was constant and he could not sleep. He certainly looked sick. He had a temperature of about 100, with the pulse in the neighborhood of 80, and respirations normal. Physical examination revealed a bulging drumhead with slight tenderness evinced by deep pressure over the mastoid antrum; there was no tenderness at the tip whatever. The patient was admitted to the wards of the hospital, gas was administered, and a free incision made, with some relief to the patient, who slept well that night. In the morning he complained of a little pain. The ear was douched with a 1:4000 bichloride of mercury solution every two hours. The discharge showed that there was a mixed infection, pneumococci and staphylococci being present. The discharge

continued for ten days, when it ceased entirely. In ten days following the operation the drum was normal in contour. There was no mastoid tenderness or temperature, and the patient felt well and so was permitted to walk around the ward. He was discharged fifteen days after his admittance.

One week later he came back complaining again of pain in the left ear and loss of sleep. At that time there were on the side of the head two large subperiosteal abscesses, one being about the size of a hen's egg. There was no history of trauma given. The drum membrane was clear and the superior wall was not at all prolapsed. There was a very slight mastoid tenderness. Operation was advised and accepted. I operated and, in making the typical incision (mastoid), no pus followed. Cutting down upon the cortex it was found to be good and sound. No pus was contained in the zygomatic or antrum cells. Apparently there was no dead bone or granulation tissue. The bony cavity was curetted. An incision was then made backward two and a half inches from the original mastoid incision through the abscesses and down to the pericranium, and then a great deal of the pus followed. After the bleeding was stopped and the periosteal flap was retracted, a perforation was found at the squamo-occipital suture, a little anterior to it. The pus simply poured out. With the rongeur forceps the opening was enlarged and a cavity exposed, the epidural floor of which was the size of a half-dollar. The dead bone was removed around the perforation; the posterior mastoid cells were removed, including the walls of lateral sinus. The sinus was covered with gauze, and I proceeded to clear out all dead bone and granulation tissue. The wound was very deep. After the mastoid cavity and sinus and the dural wound had been packed off separately with iodoform gauze, an external dressing was applied and the patient removed to the bed in the ward. He remained in the hospital until March 14th, made an uneventful recovery, and was discharged on that day. The wound healed by granulations.

Dr. Edward B. Dench: Remarks on Dr. Brandegee's case. An interesting point in the history of this case is the possible way in which infection took place. Some time ago I reported a case of an epidural abscess which occurred in a young patient after the use of the ice-coil. In this instance there was no involvement of the mastoid, but an epidural abscess was found quite far back and practically in the same region as in the case just reported.

The abscess was about the size of a quarter, and was situated so far back that I entirely overlooked it. The operation upon the mastoid had been practically completed, and, in stripping up the periosteum of the posterior flap, to be certain that I had left no softened bone in this region, I saw pus welling up from a minute opening in the bone, well under the margin of the posterior flap. I then split the posterior flap by a horizontal incision, extending backward toward the occiput, also exposing the opening from which the pus was oozing. This opening was enlarged and an epidural abscess, of the size mentioned, was found.

It seems to me that in these cases the inflammatory process extends along the wall of the lateral sinus. Such an inflammatory process may extend from the middle ear along the wall of the sinus without causing a thrombosis of the vein. In other words, we have a perisinusitis present. It is not necessary in these cases that the mastoid process shall be involved. Extension may take place along the sinus wall directly from the middle ear, without interfering with the blood current within the sinus. After following the course of the external sinus wall backward for a certain distance, an extradural collection of pus forms. As in the case presented by Dr. Brandegee and in the case reported by myself, it is not necessary that there should be any gross infection of intervening mastoid cells. Why the pus should locate itself in this particular region is entirely beyond our ken.

Extensive caries of the mastoid without rupture of the tympanic membrane.

Dr. J. B. RAE: This patient presented himself at Dr. McKernon's clinic, April 16th, complaining of pain in and behind the ear. A very indefinite history was given. Four weeks previously, while in Philadelphia, he had an earache and pain behind the ear, which compelled him to seek relief, and, for the following three weeks, he received treatment in that city. During that time there was no discharge from the ear. At the end of three weeks he came to New York, still complaining of intermittent pain in the ear, at times permitting and at times preventing sleep. After a week's time he applied for treatment at the New York Eye and Ear Infirmary.

Upon examination there was found a prolapse of the posterosuperior canal wall and some tenderness on pressure over the antrum. No perforation or cicatrix of the drum was found. He

was advised to submit to operation, which he did. Upon retracting the periosteum a drop of pus oozed from the bone in the region of the obliterated masto-squamosal suture. The bone was curetted and a small cavity was left which by no means was continuous with the antrum; there was sound bone between the antrum and the point of perforation, as far as could be detected by the eye. In removing the carious bone it was found that a liberal exposure of the sinus had to be made. From the sinus walls and the bone over the sinus pus constantly oozed. The usual mastoid wound had to be extended backward and a triangular flap turned down to allow of complete removal of softened bone.

While the case is by no means unique, I think that it presents certain points of interest. In the first place it seems to me an unusual thing to find a lack of acute subjective symptoms in cases which only can be called acute cases. In the second place there was such an extensive involvement of bone without any rupture of the membrana tympani. The point of perforation of the cortex is also a somewhat unusual one.

The moral of the case is that cases which fail to present acute subjective symptoms are apt to be overlooked and operative interference postponed beyond the limit of safety. Four weeks before operation this patient, at least it would so appear in view of the indefinite history, was in as much need of operation as at actual time of operation.

Dr. WENDELL C. PHILLIPS: I have recently had an experience so similar that it would seem not out of place to relate it. One week ago on Friday a physician brought his daughter to me for treatment; she was a girl fourteen years old, a very strong, healthy, vigorous child. She gave a history of grippe of about three weeks' standing, and for the past seven or eight days she had pain in her ear, which on one or two occasions was so severe as to keep her awake at night. On the night previous (Thursday) she had suffered a great deal of pain about the ear. She had received no treatment of any kind; had not even been examined. When I examined the drum, instead of finding a bright-red bulging drum, I found a milky-white bulging drum, such as is seen in thin drums when pus is present. She had marked tenderness over the entire mastoid. With gas anæsthesia, I opened the drum, which was followed by the discharge of pus which showed the presence of pneumococcus infection. The discharge was

very free. The ice-coil was applied and left on until the next day, Saturday. On Saturday I found still greater tenderness over the mastoid and a free discharge of pus, and I decided to operate, which I did on Sunday morning. Apparently every cell in the mastoid was involved and broken down posteriorily and anteriorly and underneath the zygomatic process, and the lateral sinus was exposed for a considerable distance. In short this was a case of extensive mastoid infection with no rupture of the drum.

Dr. EDWARD B. DENCH : Several years ago I operated upon a case at the Polyclinic Hospital, in which there was absolutely nothing demonstrable in the middle ear except a suspicious redness, which might come from the prolonged use of the speculum. The drum was incised over the area of redness and no discharge followed, except some blood. The patient's pain continued. Two days later I operated and found the antrum full of pus, although the drum membrane was nearly normal and with only a suspicious redness above the process of the malleus. This was the only case I ever saw where there was practically a normal drum membrane and yet pus in the mastoid.

Dr. TALBOT R. CHAMBERS: Two weeks ago Friday, about eight o'clock at night, a child was brought in with suppurating glands under the chin. A history of running ear and pain over the tip and antrum of the mastoid was given. The child had a temperature of 105°, and was delirious. I think these are the symptoms that call for a mastoid operation, and, at ten o'clock, I did a mastoid operation, but found no pus nor disease of the mastoid. I then went farther into the tympanum and found nothing. I took a probe, placed on its end some sterile cotton and rubbed it around in the wound and then over the agar-agar jelly, but found no germs at all. I next placed on a sterile dressing. On Sunday morning, thirty-six hours later, the temperature was 105° and the patient's condition was not good. The delirium continued, the respirations were 44, and temperature 105°. There was pneumonic consolidation. The patient was turned over to the medical side. At the end of a week the conditions subsided. When the dressings were taken down, at the end of a week, it was reported to me that all was broken down and pure staphylococcus albus was found, and so the wound behind the ear was infected.

Here was a case in which the symptoms called for operation. The chest should have been examined. I took the report of the

case from others, and feel that a diagnosis of mastoiditis is sometimes difficult to make, assuredly.

Dr. T. R. POOLEY: I do not want the gentlemen present to think that we cannot have disease of the mastoid without involvement of the middle ear. Dr. Knapp described an instance similar to the one detailed by Dr. Dench, in which there was a severe mastoiditis and extensive caries. His communication, I believe, was one of the earliest of that kind, very rare to be sure. In Dr. Rae's case it was evident enough that, although there was no rupture of the membrana tympani, there was nevertheless involvement of the middle ear.

Dr. G. B. MCAULIFFE: I had a case, occurring in a child, in which the temperature ran practically an afebrile course, never being above 99°. There was a history of a nocturnal earache eight days previous and there was present some swelling over the squama, over which the ice-coil was placed for twenty-four hours; there was no change in the tympanic membrane; the swelling did not go down, and so an operation was proposed, acceded to, and performed. The antrum was found to be carious and this caries led up to the squamous portion of the temporal, and here we found an epidural abscess the size of a dime. A peculiar point regarding this case was that the temperature ran practically an afebrile course. On the tenth day the patient seemed to lose interest in the surroundings and he took on a cerebral aspect which seemed to call for operation. The operation revealed the epidural abscess.

These cases exemplify the dictum of the French aurist who cited these cases of inflammation as "licking the drum and biting the mastoid."

Dr. JAMES F. MCKERNON: I reported a case of primary mastoid disease before the New York Otological Society, and at the same time Dr. Sheppard, of Brooklyn, reported another. In the one I reported there was absolutely no evidence of any middle-ear lesion. The drum was of a pearly whiteness and there was no pathological condition present so far as I could detect, and yet there was an epidural abscess present (perisinuous). I do not think these cases are, by any means, infrequent. The case that Dr. Rae reports is one that I saw at the time of operation, and I was struck by the remarkable lack of symptoms presented, there being but two which would suggest an operative procedure, viz: prolapse of the posterior-superior wall partially

hiding Shrapnell's membrane, and the moderate amount of tenderness over the mastoid antrum. Deep and continuous pressure was used and but very little pain was produced.

A case of tuberculosis of the middle ear.

Dr. W. H. HASKIN: S. H. G., age thirty-two years, salesman, gives good family history. Has never had any illness until Febr. 11, 1902, at which time he first noticed a rapidly increasing deafness. Suppuration of the right ear followed shortly afterward, without any previous symptoms of pain, etc. There has been no loss of weight; but for the past year the patient noticed occasional night sweats of moderate severity, and the development of a morning cough with a slight grayish expectoration. He suffers with some catarrh of the upper respiratory tract, and has a double deflection of the septum, but not sufficiently extensive to cause nasal obstruction.

Right ear: Marked deafness; constant tinnitus; constant pain past two weeks. Offensive discharge. External auditory canal is so constricted by an extensive perichondritis no view of the drum can be secured. The infiltration extends at least three-quarters of an inch from the drum. Eustachian tube open, and on inflation gives a perforation whistle.

Left ear: Marked deafness; slight tinnitus. No pain, otorrhœa, or perichondritis. The drum is a peculiar creamy color bulging in both anterior and posterior lower quadrants, as if stretched over some foreign substance beneath. Hyperæmia over Shrapnell's membrane and manubrium. Canal uninvolved. The probe, when applied to the bulgings, showed them to be yielding, and gave the impression of a semi-solid mass beneath; it produced no pain. Eustachian tube freely open, and gave no indication of fluid in the tympanum on inflation.

Hearing tests: Right ear — Voice, loud shouting slightly; watch, $\frac{0}{40}$; Galton, o.

Left ear—Voice, loud shouting only; watch, $\frac{0}{40}$; Galton, o.

Weber to left: Rinné negative.

Examination of the patient's chest showed marked consolidation of the right apex and the lower left lobe posteriorly, although no râles were found on auscultation. Dr. Smith submitted him to the X-ray, and verified the physical examination, and in addition discovered several areas of dulness throughout both lungs.

At the March meeting of this Section the case was presented for an opinion, and quite a number were given.

Using cocaine in aniline oil and alcohol as an anæsthetic, I made an extensive semicircular incision through the posterior and lower border of the left membrane, and found the middle ear and attic full of a cheesy pultaceous mass consisting of broken-down epithelial structure, but not revealing any tubercle bacilli under the microscope.

The membrana tympani was very thick, I judged almost a sixteenth of an inch, and bled very slightly. The lining membrane of the middle ear was also very thick and pale. I could not detect any caries after careful probing.

I washed out the cavity as thoroughly as possible, and ordered hot irrigations, which were kept up until April 1, 1902. On the 20th of March he came to me with intense pain in left ear and posteriorly over mastoid. On examination, I found the left canal almost closed by an acute perichondritis, with sagging most marked along superior wall. A free incision was made along line of greatest swelling, and the canal was packed with iodoform gauze.

After five days, all swelling subsided and pain disappeared.

Since April 1st have done nothing save cleanse both ears with dry cotton every other day.

He is taking cod-liver oil and creosote in increasing doses, and feels greatly benefited in general health, although his hearing has not improved.

I have been unable to find any tubercle bacilli after repeated examinations (in either sputum or aural secretions).

The perichondritis of the right canal has largely subsided, so much so that the membrane is now visible, showing two perforations surrounded with pale granulations. The tympanic membrane is much thickened, but no caries can be detected.

The secretion is very slight. May 1, 1902: The left ear has improved somewhat, and the outlines of the membrane are clearly defined again, having been obliterated by an inflammatory reaction for some time following the paracentesis.

The paracentesis wound is still patulous and surrounded by a thickened edge. The hearing has not improved, nor has the thickening of the mucous membrane of the tympanic cavity.

The right ear does not show any marked improvement in hearing.

He has had subacute attacks of perichondritis with considerable pain, but these have subsided under hot douching, having

always a sagging superior wall and thickened perforated membrane.

To me it has been a most unique and interesting condition, and had I to care for another one I should not advise any operative treatment or any active method of treatment.

Both ears have been better when left alone, and, remembering the pulmonary conditions found in the patient, I have laid aside all thought of any radical operation for his relief.

Dr. McAuliffe: I should like to ask why he calls this a tubercular otitis.

Dr. Haskin: From the general condition of the patient and the condition of the right ear, which is absolutely typical.

Dr. Brandegee: What was the character of the discharge?

Dr. Haskin: Mainly of epithelial structures. The mass filled whole middle ear and extended to the attic, and was curetted out with the blunt ring curette.

Dr. Brandegee: Was there any recurrence after removal?

Dr. Haskin: None.

Dr. Phillips: I should like to ask if the ears appeared to be the typical tubercular ears.

Dr. Haskin: When the patient was first seen the right canal was completely blocked by an extensive perichondritis, but there was no pain. Two perforations were present. I have never seen such conditions due to anything other than the tubercle bacilli.

Dr. Phillips: I asked the question because the drums that I supposed were tubercular showed great destruction of tissue; in the case presented this was not so.

Dr. B. S. Booth, of Troy: How long in existence?

Dr. Haskins: Since the fourth of February.

Dr. P. Passmore Berens: It seems to me to be scarcely fair to call this a case of tuberculosis of the middle ear unless the tubercle bacilli are found. There may be a direct infection by way of the Eustachian tube, or by way of the lymphatics, but, in either case, tubercle bacilli should be found.

Dr. Dench: Was there any vertigo, or vomiting present, or any specific history?

Dr. Haskins: None.

Dr. E. L. Meierhof: In reference to the form of tuberculosis which may occur in connection with pulmonary tuberculosis, the mere absence of the tubercle bacilli does not always disprove any tuberculosis. Cases are seen in which the ulcerations are plainly

in view and the diagnosis is made by the microscope and by exclusion; sometimes after repeated scrapings the diagnosis is negative and yet the patient may have pulmonary tuberculosis. If we depend upon the microscope in making our diagnoses we must throw out a large number of cases that have been supposed to be tuberculous. In attic tuberculosis it comes on insidiously, and the drumhead is pearly and soft, and these cases are unaccompanied by pain.

Dr. DENCH: I think one of the commonest symptoms of tuberculosis of the middle ear is the painless perforations; also, the multiple perforations which occur. The mere fact that we do not find the tubercle bacilli in the discharge does not disprove tuberculosis.

Dr. MCKERNON: I should like to speak of a case which brings out some of the points already mentioned. Some two years ago I was asked by a colleague in this city, who had developed a discharge from the left ear, to examine him. I saw him in November and, at the time, he had a cough. Examination of the ear revealed a serous discharge with multiple perforations in the drum membrane, one high up above the short process, and there was a great deal of destruction of the drumhead. There was absence of pain even when the probe was passed in. I asked him if he had had his chest examined and he answered that he had not. He had always been apparently well. I took a smear and found nothing. I asked him to go to some diagnostician and have his chest examined, which he refused to do. From this time, February to March, I saw him eight or ten times and four smears were taken, two by myself, and no evidence of tubercle bacilli was found. He poohpoohed the idea of tuberculosis. He was taking cod-liver oil. The ear kept on discharging as though a low grade of inflammation were present. There was no more destruction at the end of six weeks. The diagnosis at that time was secondary tuberculous lesion of the middle ear probably due to a pulmonary lesion. He went to Saratoga in June and there developed an acute attack of laryngitis which was diagnosed as tubercular laryngitis. He was then taken to Dr. Janeway who said that there was a consolidation over the apex and at the base posteriorly of the right lobe. This man died of pulmonary tuberculosis in November of the same year. Six weeks prior to his death there was no appreciative change in the discharge from the ear, neither had there been any marked increase in the pathological condition of the middle ear.

A case of specific labyrinthine deafness.

Dr. THOMAS R. POOLEY presented a case of deafness from labyrinthine disease, due to hereditary syphilis. The patient was a young man of nineteen years who came to the clinic February 23, 1900, suffering from parenchymatous keratitis of both eyes. He was treated with a one per cent. solution of atropine and potassium iodide, but with little improvement, when injections of bichloride of mercury, 1:10,000, were made under the conjunctiva. The right eye improved, but the left eye became worse. This treatment was then discontinued, and the patient was admitted to the hospital. Inunctions of mercury were made and a one per cent. solution of atropine instilled twice daily, leeches applied, and 20 grains of iodide of potassium administered three times a day. Under this plan of treatment his eyes improved and he was discharged April 20th with no further inflammatory symptoms, and only the usual macula corneæ. January 22, 1902, he again came to the clinic, on account of sudden and complete loss of hearing which came on with loud and persistent tinnitus, vertigo, and staggering gait. There was not the slightest perception of sound, and bone-conduction was perfectly negative. An examination of the ears showed the usual appearance of chronic aural catarrh, but not enough to account for the absolute loss of hearing. A diagnosis of labyrinthine disease was made. He was admitted to the hospital, given mercurial inunctions and iodide of potassium in gradually increasing doses, but without any good result, and he was again discharged.

March 24th he was again taken into the hospital, the same symptoms being present, extreme vertigo, staggering gait, etc. On closing the eyes there was entire loss of equilibrum, but this was not so marked with the eyes open. Still he had roaring noises in the head and was absolutely deaf to all tests. All other medication was stopped and one-quarter ($\frac{1}{4}$) of a grain of pilocarpine was given hypodermically for two weeks. The hearing in the left ear rose until at the end of two weeks he could hear a watch on contact and a moderately loud voice close to the ear. This improvement, however, was but temporary and the dose of pilocarpine was increased to one-half ($\frac{1}{2}$) a grain a day, but this was followed by so much disturbance to the stomach and heart that it had to be discontinued.

When shown to the Section, he could still hear voice in the left ear. The right ear remains entirely deaf. The case was inter-

esting because of the etiology and, again, on account of the improvement in hearing from the use of pilocarpine after the entire failure to effect any improvement by anti-syphilitic treatment. It was also interesting to note that there was always a temporary increase in the acuteness of hearing after each injection of pilocarpine.

Remarks on Dr. Pooley's case:

Dr. EDWARD B. DENCH: I think this is an extremely interesting case. I have under observation at the hospital the case of a young girl suffering from hereditary specific disease. On examination, the patient shows all the typical reactions of labyrinthine deafness. In addition to the above, the signs of hereditary syphilis, such as Hutchinson's teeth, etc., are present. This patient improved greatly under large doses of iodide of potassium together with pilocarpine hydrochlorate, adminstered internally to the physiological limit. In this patient the hearing became perfectly normal under this plan of treatment. She, however, passed from observation and was practically without medication for about a year and a half. When I saw her a few days ago there was considerable impairment in the hearing. I feel certain that the case will again improve upon large doses of iodide of potassium in conjunction with pilocarpine.

Another case of acquired syphilis has come under my observation recently. This occurred in a coachman whose hearing suddenly became so much impaired that he was obliged to give up his work. At the first examination, he denied absolutely any specific infection, and there was no evidence of hereditary syphilis. I, however, sent him to a prominent syphilographer, who told me that without question the man was infected. The patient was placed upon subcutaneous injections of one of the salts of mercury, and at the same time pilocarpine hydrochlorate was given in full doses by the mouth. The patient's hearing immediately improved and at the present time is normal, and he has been able to resume his work.

In the third patient, a baseball player, there was slight impairment of hearing, distressing tinnitus, and moderate vertigo, especially when exercising. The vertigo increased to such an extent that the patient was not sure of himself when practising in the field, and felt he would be obliged to give up his position. There was a history of syphilis six months before. Upon functional examination distinct evidences of labyrinthine involvement

were found. In addition to this, there was some slight catarrhal inflammation involving both middle ears, both Eustachian tubes being slightly narrowed. Under subcutaneous injections of mercury and the administration of pilocarpine to the physiological limit, the vertigo entirely disappeared, the subjective noises were greatly improved, and the hearing became nearly normal. It was impossible for the patient to keep up the administration of pilocarpine as long as I desired. He had obtained so much relief from a comparatively short course of treatment that he felt justified in going on with his athletic work, which necessitated the abandonment of treatment for the present.

In regard to the administration of pilocarpine in these cases, I do not think that it is necessary to give the drug hypodermatically. The cases mentioned are simply examples of a large number in which I have obtained most flattering results from the use of this drug. In all of my cases the drug has been given by the mouth. If the drug is to be given hypodermatically, it is necessary for the patient to give up his work for the period during which the drug is being administered. As no beneficial results can be looked for until the drug has been taken for several weeks, the subcutaneous method is almost always inapplicable to a large number of dispensary cases. As before stated, I have administered the drug almost entirely by the mouth. The patient is given a 4 % solution of pilocarpine muriate, and is told to take four drops of this solution morning and night. This corresponds to about one-sixth of a grain of the salt. If the morning dose is taken very early, the patient can spend two hours in bed before going to his work, by which time the danger of taking cold during the stage of perspiration induced by the pilocarpine is passed. After the dose taken at night, the patient, being in bed, is naturally protected from any danger of taking cold during the stage of diaphoresis. In this way, the drug can be given without interfering with the patient's work. Another point which I think it is wise to bear in mind is, that it is not necessary to induce profuse diaphoresis in order to obtain the beneficial effects of the drug. The patient should take just enough to cause slight salivation, or a slight increase in the cutaneous secretion. Herein lies the advantage of giving the drug in solution. After the patient has acquired a certain tolerance for the drug he can gradually increase the dose, so that after each ingestion of the medicine a distinct but not excessive physiological effect is obtained. In this

way, the best results are secured without weakening the patient and without causing him any undue discomfort.

Dr. PHILLIPS: I should like to ask if the vertigo was lessened by the use of the pilocarpine.

Dr. DENCH: Yes.

Dr. MEIERHOF: This sort of treatment in connection with syphilis is nothing new; we all know it is carried out at Hot Springs, and elsewhere. I know of one man who has had a large experience in the treatment of syphilis who, after he has exhausted all the good effects to be obtained from the iodides and mercury, orders the hot treatment, causing sweating either by hot baths or hot springs.

Dr. POOLEY: I was much interested in the remarks of Dr. Dench because his experience coincides with mine. Judging from a limited experience, I should say that the prognosis in labyrinthine deafness is better in acquired than in hereditary syphilis.

BOOK NOTICES.

VIII. **Lehrbuch der Ohrenheilkunde** (Text-book of Otology). By Prof. L. JACOBSON, M.D., and Dr. L. BLAU, Aural Surgeons in Berlin.

Third edition of Jacobson's *Lehrbuch*, 555 large 8° pages, with 345 illustrations on 19 plates. Leipzig: Geo. Thieme, 1902.

Jacobson's excellent text-book maintains its reputation in following thoroughly the rapid developments of otology since the appearance of the first edition, which presented a faithful portrait of the otology of 1894. The portrait taken by the second edition in 1897 was enlarged and more elaborate than the preceding, from which it distinguished itself by raising its character from furnishing not only all the knowledge that the educated aural practitioner needs, but also a most careful and comprehensive bibliography, affording the reader an opportunity to resort to the sources of otological knowledge, enabling him to become an investigator in, and a promoter of, aural science and art. The present edition follows the second in character, but so much had to be added to the subject-matter in the text, the illustrations, and literary references, in order to do justice to the advances made in our specialty during the last five years, that the author (Jacobson) found it impossible to do the work alone. He therefore associated with himself as coeditor of the new edition Dr. L. Blau, who for years had been his professional companion, and essentially shares his scientific views. He was fortunate in this choice, for Dr. Blau has long been credited with making the best annual reports on the progress of otology, and lately earned the thanks of the profession for his judicious and able editing of the *Encyclopaedie der Ohrenheilkunde.*

The improvements made in the third edition are comprehensively stated in the preface, and the reviewer thinks it best to transcribe them:

"Owing to the rapid strides in our science, supplements have been necessary in almost every chapter. The greatest number of additions or changes are in the sections on the faculty of hearing in the normal condition, the tests of audition, the differential diagnosis of the affections of the conductive and perceptive apparatus [pp. 54–89], on the pneumo-massage of the middle ear [p. 113, etc.], the chronic suppurative inflammation of the middle ear [pp. 206–230], the dry catarrh of the middle ear [pp. 241–257], the operative opening of the mastoid portion, including the "radical operation" [pp. 277–304], on deaf-mutism [pp. 404–411], on the otitic diseases of the brain, the meninges and sinuses, the otitic pyæmia and septicæmia, on the complications of the hearing organ in scarlet fever, diphtheria, tabes, and tuberculosis [pp. 474–478 and 486–490]."

"In the treatment of diseases we have given not only our views but also those of other authors, especially in departments that have only recently been conquered and where the best management is still sharply contended, as in the otitic complications of ear disease; further in diseases in which treatment thus far has proved unsatisfactory, viz., the dry middle-ear catarrh, where a large number of the therapeutic propositions may be welcome to many of our readers."

The arrangement of the book is of the category of those that are to supply the wants of two classes of readers: (1) students and general practitioners; (2) ear specialists. The wants of the former are distinguished by being printed in larger type. The anatomy —all in small type—is given in full detail, with four neatly executed lithographic plates, presenting all the details of the hearing organ, including the primary hearing and visual centres, the sensory auditory and visual areas being the places concerned in word-deafness and word-blindness.

All the chapters of the book are written with great care; the descriptions are unexceptionally clear; the diction is good, idiomatic German (free from provincialisms), so that the English-speaking student who wants to improve his German will have the double benefit of enriching not only his medical but also his literary knowledge.

The book can be conscientiously recommended to advanced students and aural surgeons. For beginners, the reviewer would advise a smaller book, *e. g.*, such as Hartmann's, Pritchard's, or Gorham Bacon's. H. K.

IX. **A Manual of Otology.** By GORHAM BACON, A.M., M.D., Professor of Otology in Cornell University Medical College, New York. With an introductory chapter by CLARENCE J. BLAKE, M.D., Professor of Otology in Harvard Medical School, Boston. New (third) edition. In one handsome 12mo volume of 437 pages, with 120 engravings and 7 plates in colors and monochrome. Cloth, $2.25 net. Lea Brothers & Co., publishers, Philadelphia and New York.

Dr. Bacon's popular treatise has just appeared in a new (third) edition. The text has been enlarged about twenty pages, new illustrations, and paragraphs on lumbar puncture and leucocytosis have been added. The book deserves its popularity.

A. K.

X. **Diseases of the Nose, Pharynx, and Ear.** By HENRY GRADLE, M.D., Professor of Ophthalmology and Otology in the Northwestern University Medical School, Chicago. Pages 547. Philadelphia and London: W. B. Saunders & Co. Price, $3.50 net.

This volume, the latest addition to the increasing number of text-books on diseases of the nose and ear, possesses some excellent features which will insure its popularity with general practitioners and students, and which will be greatly appreciated by those intending to practise the specialty of rhinology and otology. It is the result of a long clinical experience, and the author's aim has been to answer the many questions presenting themselves to the less experienced clinician, particularly in reference to those points not usually mentioned in the routine text-books. This object has been well attained, and the resulting treatise bears the stamp throughout of personal experience, of keen observation, and of sound judgment.

Book I., on diseases of the nose and pharynx, comprises about two-thirds of the entire volume, the remaining one-third forming Book II. on diseases of the ear.

Special care and attention have been given to topographical anatomy, which is dealt with in a particularly lucid style. The numerous illustrations are happily selected from the standard works of Zuckerkandl, Politzer, Gegenbauer, and Hajek. The discussions on etiology and pathology, on symptomatology and diagnosis, are concise and to the point and clearly based on personal experience. The chapters on general therapeutics and on local treatment and surgery are thoroughly practical and contain

much detailed and valuable advice. The intimate relations between nasal and aural lesions are dwelt upon at every opportunity, and the removal of nasal obstructions is advised as "indispensable in affections of the ear which persist in spite of all other treatment."

The subject of adenoid vegetations is well presented. The indications for and the method of their removal are outlined in detail. As to general narcosis, the author is convinced that it does not in any way permit a "more thorough operation," and also that the pain in a well-arranged operation is "not sufficient to necessitate the superfluous risk of an anæsthetic." He uses a curved guillotine of his own device (practically like Schütz's adenotome) and praises the operation by means of this instrument as "the easiest, quickest, and most thorough." We don't doubt the effectiveness of the "curved guillotine," but we beg to state that a simple instrument like Beckmann's or a similar knife cannot be surpassed in effectiveness if properly handled, and that the cumbersome guillotine attachment may be dispensed with. The chapters on the nasal accessory cavities are extremely well written, and the whole presentation of this difficult subject is abreast of the most recent advances in the diagnosis and treatment of sinus diseases.

Book II., on diseases of the ear, is, as a whole, equally creditable to the author's thoroughness and good judgment. The clinical analysis is always lucid, and the therapeutic measures recommended are those that have stood the test of the author's personal experience. Much attention has been given to the "conservative treatment" of chronic suppuration. The presentation, however, of the modern surgical treatment of middle-ear disease is somewhat disappointing, and the description of the "radical operation" is perhaps a little meagre. But this is a small matter, as the technique of a difficult and delicate operation cannot be acquired from the study of text-books. Altogether, the author has produced an excellent and interesting treatise, which may be heartily commended to our readers. R. J.

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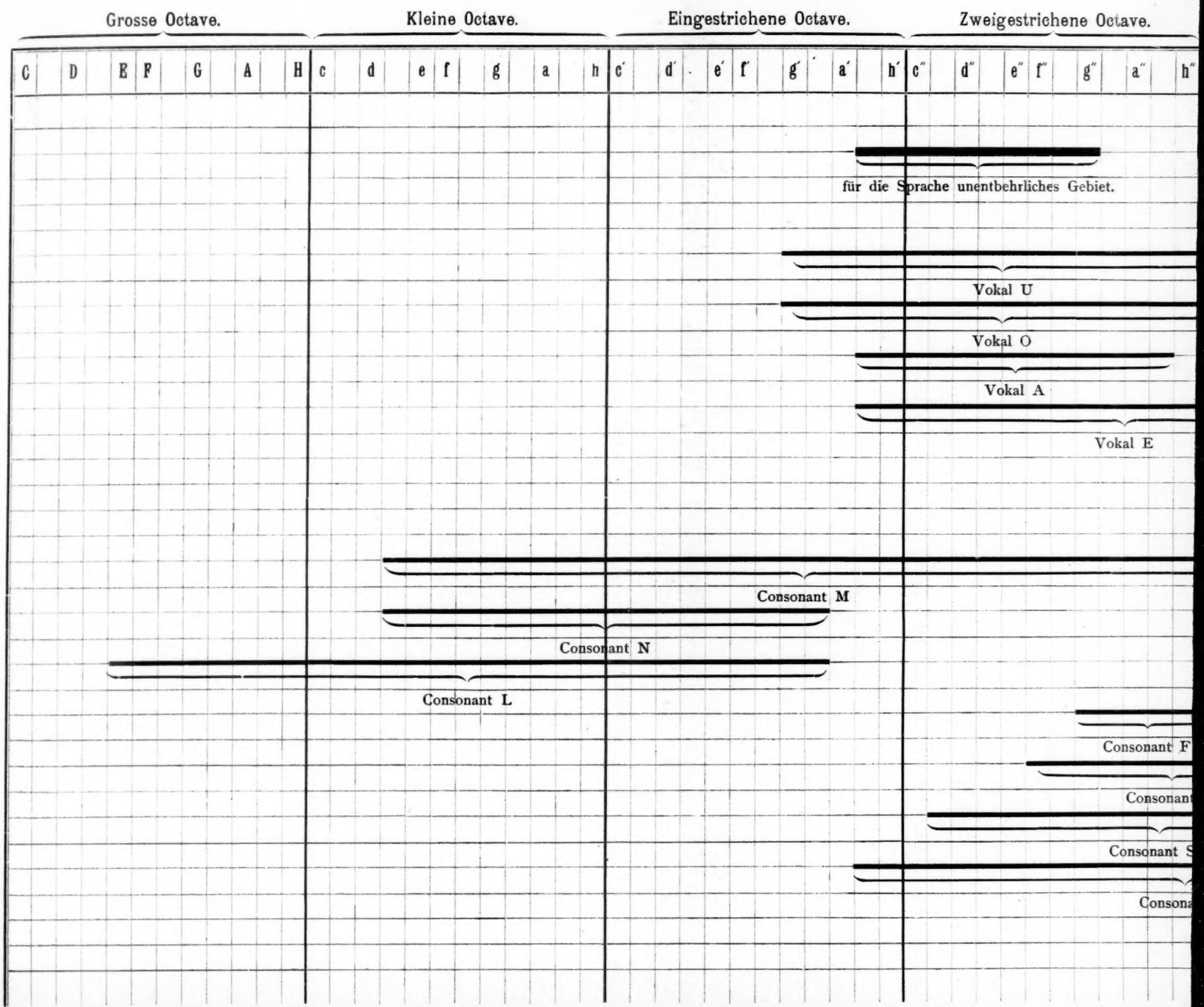

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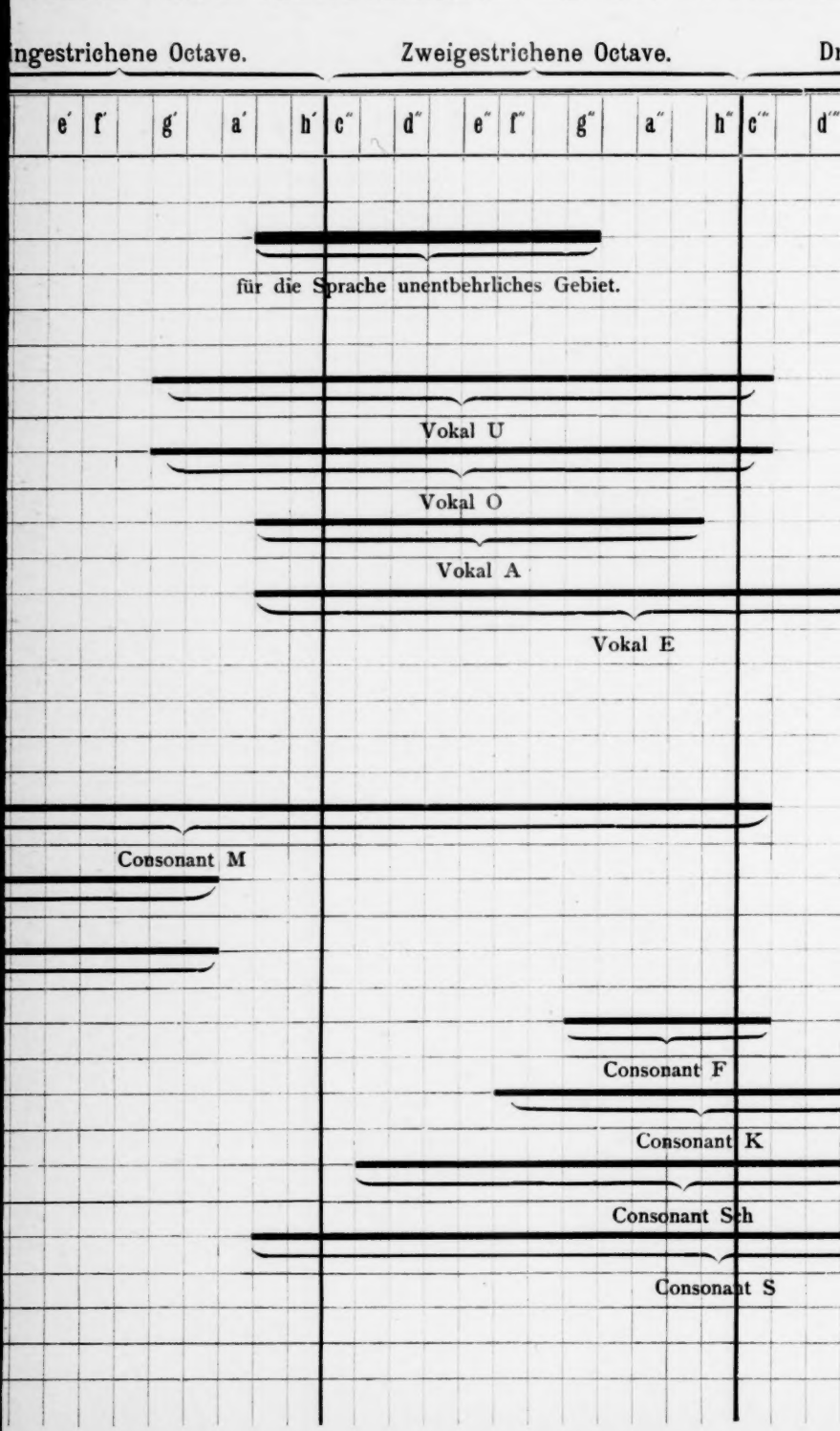

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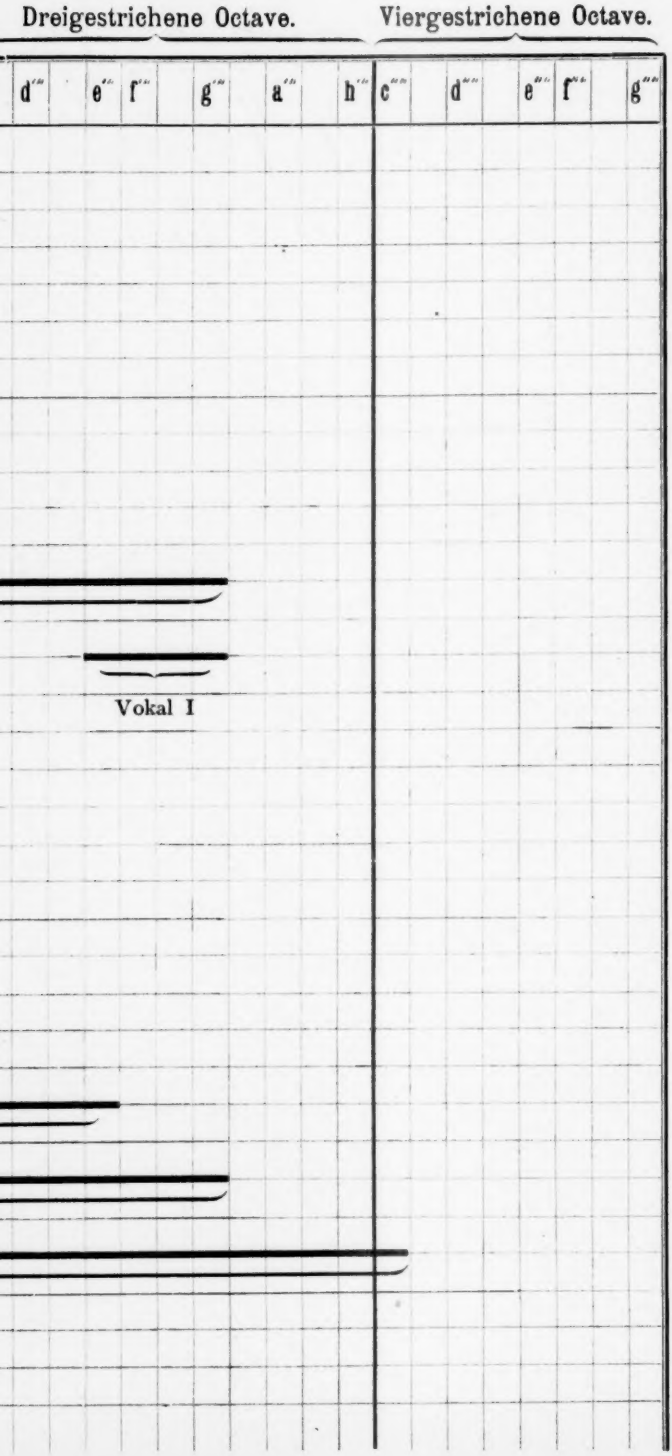

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a^1				st	0.1	st	st		
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f^1									
e^1									
d^1									
c^1									
h									
a	0.2	0.1		0.1	st	0.1	0.2	0.1	0.1
g									
f									
e									
d									
c									
H									
A				0.1				0.1	
G									
F									
E									
D									
C									
H'									
A'									
G'								0.2	0.1
F'									
E'									
D'									
C'									
30									
28									
26									
24									
22									
20									
18									
16									
	1.	2.	3.	4.	5.	6.	7.
---	---	---	---	---	---	---	---
a^1							
g^1							
f^1							
e^1							
d^1							
c^1							
h							
a	st	0.2	0.1	0.3	0.1	0.3	0.5
g							
f							
e							
d							
c							
H							
A	st	0.1	0.2	0.3		0.1	0.3
G							
F							
E							
D							
C							
H'							
A'							
G'		0.2	0.1				
F'							
E'							
D'							
C'							
30							
28							
26							
24							
22							
20							
18							
16							
	32 l.	34 l.	54 r.	17 r.	18 l.	37 r.	39 r.

	1.	2.	
a^1			
g^1			
f^1			
e^1			
d^1			
c^1			
h			
a	st	0.4	0
g			
f			
e			
d			
c			
H			
A	st	0.4	0
G			
F			
E			
D			
C			
H'			
A'			
G'	st	0.2	0
F'			
E'			
D'			
C'			
30			
28			
26			
24			
22			
20			
18			
16			
	61 l.	16. l.	

Verlag von J. F. Bergmann, Wiesbaden.

Die Ergebnisse der Prüfung auf reine Töne bei den Partielltauben.

b, mehrfache Inseln. | *Gruppe II.* | *Gruppe III.* | *Gruppe IV.*

19.	20.	21.	22.	1.	2.	3.	4.	5.	6.	7.	8.	9.	1.	2.	3.	4.	5.	6.	7.	1.	2.	3.	4.	1.	2.	3.	4.	1.
				0.2	st	st	0.2	st						0.2		0.3	0.5											0.2
				0.1	0.1		0.1	0.1																		0.5	st	
				0.3			0.1						st					0.2	0.5							0.3	0.1	
															0.1		0.4	0.2	0.6				0.3				0.4	
		0.2					st	0.1	st	st				0.2	0.1	0.3	0.1	0.3	0.5		0.2	0.3	0.5	0.1	st	0.3	0.5	
3					0.2	0.1		0.1	st	0.1	0.2	0.1	0.1	st	0.4	0.3	0.4	0.3	0.4	0.4	st	0.4	0.5	0.5	0.3	0.1	0.5	0.6	
.1	0.2							0.1			0.1		st	0.1	0.2	0.3		0.1	0.3		0.4	0.3	0.7	0.3	0.1	0.4	0.5	
		0.3									0.2	0.1		0.2	0.1					st	0.2	0.3	0.4					

r. 27 r. 61 r. 26 l. 60 r. 12 r. 36 l. 53 r. 53 l. 8 l. 19 r. 55 r. 28 l. 32 l. 34 l. 64 r. 17 r. 18 l. 37 r. 39 r. 61 l. 16 l. 58 l. 58 r. 51 r. 51 l. 17 l. 47 r. 48 l.

Tafel X.

	Gruppe V.			Gruppe VI.													Der aphasische Zögling		
	1.	2.	3.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.			
																					1
																					2
																					3
																					4
																					5
																					6
																					7
																					8
																					9
																					10
																					11
																					12
																					f^5
																					e^5
																					d^5
																					c^5
																					h^5
																					a^4
	0.2	st	0.2	st	0.1	0.3	0.1	0.5	0.2	0.4	0.1	0.1	0.5	0.4	0.3	0.2	0.1	0.1	1.0	1.0	g^4
																					f^4
																					e^4
																					d^4
	st	st	0.4	st	st	0.1	0.2	0.7	st	0.7	0.2	0.4	0.8	0.7	0.9	0.5	0.5	0.2	0.9	1.0	c^4
																					h^3
																					a^3
	0.1	0.1	0.3	0.1	0.4	0.5	0.2	0.6	0.3	0.6	0.2	0.3	0.5	0.4	0.5	0.7	0.3	0.4	1.0	0.8	g^3
																					f^3
																					e^3
																					d^3
																					c^3
																					h^2
		0.1	0.4	0.3	0.5	0.7	0.4	0.6	0.6	0.9	0.6	0.6	0.7	0.9	0.8	0.8	0.3	0.2	1.0	1.0	a^2
																					g^2
																					f^2
																					e^2
																					d^2
																					c^2
																					h^1
				0.1	0.7	0.5	0.2	0.6	0.7	0.8	0.7	0.6	0.8	0.8	0.6	0.9	0.1	0.1	1.0	0.9	a^1
																					g^1
																					f^1
																					e^1
																					d^1
																					c^1
																					h
				0.2	0.4	0.6	0.1	0.4	0.4	0.5	0.5	0.4	0.7	0.8	0.7	0.8	0.3	0.2	1.0	1.0	a
																					g
																					f
																					e
																					d
																					c
																					H
									0.8	0.7	0.2	0.6	0.7	0.8	0.4	0.4	0.3	1.0	1.0	A
																					G
																					F
																					E
																					D
																					C
																					H'
																					A'
													0.4	0.5	0.7	0.6	0.3	0.2	1.0	1.0	G'
																					F'
																					E'
																					D'
																					C'
																					30
																					28
																					26
																					24
																					22
																					20
																					18
																					16

48 l. 32 r. 36 r. [illegible] r. 35 l. 20 r. 26 r. 13 r. 42 r. 13 l. 42 l. 39 l. 35 r. 38 r. 20 l. 38 l. 34 r. 21 l. 24 r. 24 l.

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